DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

HEARINGS

BEFORE THE

JOINT COMMITTEE ON ATOMIC ENERGY

CONGRESS OF THE UNITED STATES

EIGHTY-FOURTH CONGRESS

FIRST SESSION

ON

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

PART 1 OF THREE PARTS

JANUARY 31; FEBRUARY 1, 3, and 4, 1955

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DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

MONDAY, JANUARY 31, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met at 2 p. m., pursuant to notice, in room F–38, the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson, Pastore, Gore, Jackson, Hickenlooper, Millikin and Bricker; and Representatives Durham, Holifield, Price, Cole, and Van Zandt.

Chairman ANDERSON. The Joint Committee will be in order.

I am sure that all members of the Joint Committee and others who are here would like to make sure that the first order of business this afternoon is to wish Admiral Strauss a very happy birthday. I have a very bad cold and I will not join in singing Happy Birthday to him, but I am sure we would all want to wish him an extremely happy birthday, and I am sure we all do.

Now, very briefly I want to say that there has been a request here for some television time. If there is no objection from anyone, I am going to read a very brief statement; and after that if the television cameras want to work they can take the first minute or 2 or 3 or 4 of the statement of Admiral Strauss, and then at a signal, if you do not mind, if you will just fold up your tents and go on your way we would appreciate it.

The Atomic Energy Act of 1954, in section 202, requires the Joint Committee to make continuing studies of the activities of the Atomic Energy Commission and of the problems relating to the development, use, and control of atomic energy. It also specifically states during the first 60 days of each session of the Congress the Joint Committee shall conduct hearings in either open or executive session for the purpose of receiving information concerning the development, growth, and state of the atomic energy industry. In accordance with that statutory duty, the committee has called the hearings which begin today.

On January 19, 1955, the committee directed a letter to the Atomic Energy Commission, outlining the areas it particularly wished the Commission to cover in its presentation during this hearing. I shall place in the record at this point the committee's letter to the Commission.

(The letter referred to follows:)

JANUARY 20, 1955.

Hon. LEWIS L. STRAUSS,
Chairman, United States Atomic Energy Commission,
Washington 25, D. C.

DEAR CHAIRMAN STRAUSS: In compliance with the provisions of section 202 of the Atomic Energy Act of 1954, the joint committee is scheduling open and executive hearings on the development, growth, and state of the atomic energy industry to begin on January 31, 1955, at 2 p. m.

The committee has determined to begin these hearings with a status report by the Commission. The afternoons of January 31, February 1, 3, and 4 have been set aside for the Commission's presentation in open session. In addition, the afternoon of February 2 has been reserved for an executive meeting with the Commission to discuss those matters which cannot be examined freely in public hearings.

While the committee does not desire to exclude any matter from the report which the Commission deems proper to present, it is suggested that the following subjects should receive appropriate attention:

1. The state of the atomic art as it concerns peacetime applications, particularly power development, bringing up to date the AEC presentation of last May;
2. The recently announced Demonstration Power Program and its relationship to the Five-Year Reactor Development Program started last spring;
3. Commission pricing policy;
4. Licensing procedures and regulations which the Commission plans to put into effect;
5. Commission actions and present thinking on control and dissemination of information, and scope and extent of security clearances, with particular reference to the relationship of these areas to the new industry;
6. Any problems or hazards the Commission foresees which may tend to reduce industrial participation in the atomic energy field;
7. ABC patent activities, and the Commission's views on the role of compulsory licensing of patents in the new industry;
8. The role of industry in helping carry out agreements for cooperation, with particular reference to how the Commission plans to discharge its regulatory and licensing functions in this field;
9. Plans for training scientists and engineers both for the domestic industry and foreign countries;
10. The domestic uranium mining industry; and
11. Commission compliance with organizational changes required under the new act, with particular reference to the effect of these changes on industrial activities.

It would be most helpful if 50 copies of either the entire text of the first day's testimony or a subject outline thereof could be made available to the committee no later than January 26. In addition, we would appreciate receiving 50 copies of either the full text or a précis of each subsequent day's testimony no later than 24 hours in advance of its scheduled presentation.

Sincerely yours,

CLINTON P. ANDERSON, *Chairman.*

Chairman ANDERSON. The committee also authorized its chairman to issue a general invitation to industrial or private groups or individuals to submit requests to present testimony pertinent to the development, growth, and state of the atomic energy industry, and to issue individual invitations to present testimony to all persons and organizations who have testified previously on the Atomic Energy Act of 1954, and to representatives of groups and organizations active in the atomic energy field. I should like at this point to place in the record the committee announcement covering these points.

(The announcement referred to follows:)

[From the offices of the Joint Committee on Atomic Energy—For immediate release January 19, 1955]

The Joint Committee on Atomic Energy will begin public and executive hearings on the "development, growth, and state of the atomic energy industry," on

Monday, January 31, Senator Clinton P. Anderson, chairman, announced today.

The Joint Committee is required by the Atomic Energy Act of 1954 to hold such hearings in the first 60 days of each session of Congress.

"We have requested the Atomic Energy Commission to prepare a status report on its activities under the new law, with particular emphasis on its pricing, licensing, and regulatory functions," Senator Anderson said. "The primary purpose of these hearings is to provide a public forum through which the industrial and general public can be informed of Commission thinking and activities, and can in turn present their views on problems and progress in the new industry. After the Commission has presented its report, we will hear from public witnesses."

Senator Anderson stated that the Atomic Energy Commission would be asked to cover the following points in its testimony:

1. Review the state of the atomic art as it concerns peacetime applications, particularly power development, bringing up to date their presentation of last May;

2. Description of the recently announced Demonstration Power Program and its relationship to the Five-Year Reactor Development Program started last spring;

3. Discussion of Commission pricing policy;

4. Outline of licensing procedures and regulations which the Commission plans to put into effect;

5. Description of Commission actions and present thinking on control and dissemination of information, and scope and extent of security clearances, with particular reference to the relationship of these areas to the new industry;

6. Comment on any problems or hazards the Commission foresees which may tend to reduce industrial participation in the atomic energy field;

7. Report on the AEC patent activities, and a discussion of the Commission's views on the role of compulsory licensing of patents in the new industry;

8. The role of industry in helping carry out agreements for cooperation, with particular reference to how the Commission plans to discharge its regulatory and licensing functions in this field;

9. Plans for training scientists and engineers both for the domestic industry and foreign countries;

10. Discussion of the domestic uranium mining industry; and

11. Discussion of Commission compliance with organizational changes required under the new act, with particular reference to the effect of these changes on industrial activities.

Senator Anderson also announced that the Joint Committee had authorized him to issue a general invitation to industrial or private groups or individuals to submit requests to present testimony pertinent to the "development, growth, and state of the atomic energy industry." He said that any person desiring to present a statement or give testimony pertinent to the subject in either public or executive session should send a brief résumé of his views to the committee not later than January 31 for committee consideration.

Senator Anderson also said that individual invitations to present testimony will be sent to all persons and organizations who have testified previously on the Atomic Energy Act of 1954, and to representatives of groups and organizations active in the atomic energy field.

A proposed tentative schedule of the hearings is as follows:

January 31: Afternoon; open; Commission
February 1: Afternoon; open; Commission
February 2: Morning; executive; conference
February 2: Afternoon; executive; Commission
February 3: Afternoon, open; Commission
February 4: Afternoon; open; Commission
February 7: Morning; executive; conference
February 7: Afternoon; open; public witnesses
February 8: Afternoon; open; public witnesses
February 9: morning; executive; conference
February 9: Afternoon; open; public witnesses
February 10: Afternoon; open; public witnesses
February 11: Morning; executive; conference

It is not anticipated that all witnesses will be heard before February 11, and the committee has signified its intention of continuing the hearings later in February or early in March, depending upon the number of persons wishing to testify.

Chairman ANDERSON. In compliance with the committee's instructions, the chairman sent 140 invitations to such individuals. Responses have been received by the committee, and by Friday of this week the Chair hopes to announce the schedule of public witnesses for next week.

Our first witness in this opening hearing is Mr. Lewis L. Strauss, the Chairman of the Atomic Energy Commission.

STATEMENTS OF LEWIS L. STRAUSS, CHAIRMAN; THOMAS E. MURRAY, MEMBER; DR. WILLARD F. LIBBY, MEMBER; AND KENNETH D. NICHOLS, GENERAL MANAGER OF THE ATOMIC ENERGY COMMISSION

Mr. STRAUSS. Mr. Chairman, first, may I say that it is a privilege for me to be here and participate in these hearings called by your committee pursuant to the provisions of the Atomic Energy Act of 1954.

I thank you, too, for your kind personal remarks before you began. I cannot think of a more relaxing way of spending a birthday.

I would first like to make a few brief introductory remarks, and would then like to present prepared reports on the various topics referred to in your committee action of January 19, 1955, to which you have just made reference.

By way of introduction to the Atomic Energy Commission's report to your committee under section 202 of the Atomic Energy Act of 1954, it might be appropriate to submit to you this general summary of progress achieved thus far.

The foundations on which American industry will participate in the use of atomic energy already are well advanced. A substantial portion of industry is in a position to take part in the development of atomic energy through the Commission's expanded industrial participation program.

We are going forward on many fronts with the broad purpose of hastening the day when the American people enjoy the commercial benefits of this new source of energy.

The fact that 33 industrial firms were considered qualified to design, build, and assure the successful operation of the first small power reactor for the Army, and that 18 of them submitted fixed-price proposals, is a striking example of the transition that is underway, away from Government monopoly and toward competitive industrial participation under the provisions of the new act.

Potential customers for power reactors have been encouraged to join the program. Furthermore, potential manufacturers of reactors and reactor components, and other groups that will be needed to maintain and service the new industry, have successfully been encouraged to join.

Acknowledgement should be made of the close and efficient cooperation between the Atomic Energy Commission and the armed services, not only in the development, production, and testing of weapons, but in advancement of the peacetime applications of atomic

energy, and especially in reactor technology. By means of such projects as the Army Power Reactors Program, the Navy's Reactor Program and the Air Force's Aircraft Reactors Program, a great store of technological knowledge is being contributed to commercial progress in this field. The cooperation that is evident between the service units working with the AEC is an example of effective unification of the services and of military and civilian teamwork toward a common objective.

The Commission, as a result of its development programs, is advancing the time when the atom can supplement other sources of energy to meet the Nation's power requirements on an economic basis. These needs are increasing rapidly.

Subordinate only to the paramount objective of "making the maximum contribution to the common defense and security" is the new law's injunction that we direct the development, use and control of atomic energy so as to promote world peace.

This is in keeping with President Eisenhower's "Atoms for Peace" proposal before the General Assembly of the United Nations on December 8, 1953, outlining a far-reaching program for the development of international cooperation in the peaceful uses of atomic energy.

We have joined with other agencies of Government in pushing forward with this plan. Our proposal that there be an international conference to discuss the peaceful applications of atomic energy received the unanimous approval of the General Assembly of the United Nations and this conference will be held in August of this year in Geneva, Switzerland.

The United States has allocated to the work of the international agency 100 kilograms of fissionable material suited to the operation of research and medical reactors in other parts of the world. The United Kingdom has allocated another 20 kilograms. This material is not to be of weapon grade.

The AEC has taken specific steps to provide training and information for scientists and engineers of other nations and the first of these programs will go into operation in the near future.

Since enactment of the Atomic Energy Act of 1954, the Commission has taken action to accelerate the pace at which industry can take on the commercial development and use of atomic energy.

The study agreement program, established for the purpose of enabling private industry to cooperate in nuclear power developments, recently has been revised and simplified under provisions of the 1954 act. There has been established a "gray area" of less sensitive data embodying much of the information necessary for peaceful application of the atom. At the moment, we are engaged in the major task of reclassifying into the less sensitive category of "Confidential-restricted data" the vast bulk of reactor technology associated with such peaceful applications. This will permit easier handling of this information and will allow its dissemination to "L" cleared individuals. The "L" clearance is based on a national agency file check. It is, of course, less costly and time-consuming than full investigations and it is believed it will be adequate for less sensitive information.

Because of the greatly increased interests of industry in the commercial development of atomic energy, three types of participation agreements have been set up, replacing the previous study agreements.

The first, or access agreement, primarily is for those who wish to ascertain for themselves the role they wish to play in the new industry. The second, or study agreement, is designed for those who need access to secret data to determine their role, or evaluate a specific project in which they are interested. The third, or commercial agreement, is for companies which have determined their role and need continuing access to classified information to carry out their work.

It is expected that perhaps as many as 100 new participation agreements may be signed this year, in view of the growing interest in the program. The Commission is anxious to bring new groups into the undertaking with the assurance that all aspects of the new industry will receive equitable attention. Recently the Commission approved the execution of an agreement with the National Rural Electric Cooperative Association.

In line with the participation program I have just described, the Commission has stepped up its training of nuclear engineers and has made available to industry its facilities, not available elsewhere, for use in developing techniques for commercial applications of atomic energy. The latter includes such AEC facilities as the Materials Testing Reactor and Brookhaven Laboratory. The Commission's school at Oak Ridge has graduated about 300 trained scientists and engineers, almost all of whom are engaged in reactor technology. In addition, many industrial employees are receiving on-the-job training by assignment to AEC laboratories and projects, and this phase of the training program is being accelerated.

The Commission recognizes that the greatest advances in reactor technology will come from the actual construction and operation of large-scale reactors on a commercial basis. There is no effective substitute for such practical experience. Therefore, in order to further encourage such actual construction and commercial operation, the Commission has inaugurated a Power Demonstration Reactor Program. Its purpose, of course, is to obtain even greater participation by industry in achieving the ultimate objective of economically competitive nuclear power.

Under the Power Demonstration Reactor Program, industry—both privately and publicly owned—may assume both technical and financial responsibility for constructing and operating power reactors.

We anticipate, of course, that the first nuclear power plants will be uneconomic, regardless of design. The Government could choose, as it has in the past, to pay all costs and retain full responsibiilty for the project. Instead, the Commission hopes that industry will assume the responsibility and as much of its cost as it can justify. The costs will be shared, in a ratio to be determined by competitive proposals. The Government's share of the cost will be a fixed amount, determined in advance. The Government's assistance may take one or more of three forms: (1) A waiver of the charge that the licensee otherwise would be required to pay for the use of special nuclear material or source material furnished by AEC; (2) the use of AEC laboratories and test facilities, and (3) financial assistance under appropriate research and development contracts.

Interested parties have until April 1, 1955, to file proposals with the Commission for the private construction and operation of such demonstration power reactors.

Industry has expressed a substantial interest in the Power Demonstration Reactor Program which promises to be an effective incentive for the construction of such reactors in the early future. The program will benefit from the incentive which competitive industrial enterprises have to cut costs. At the same time, necessary assistance will be given industry during the early years while nuclear power costs are above the level of conventional power cost. Large-scale reactors of several designs must be built to determine which of the reactor systems is most efficient and practical for commercial use. This cannot be determined, in this new era of atomic energy, from paper studies or from small-scale "pilot" plants. Not only will Government costs be reduced through the industrial incentives and cost sharing but a new supply of technical and economic knowledge in this new field will become available. The success of this program should markedly strengthen our Nation.

The Atomic Energy Commission itself is making positive and uninterrupted progress in the development of reactor technology which will be of great use to industry. We have pushed forward the work on the five reactors of various types described in the program presented to the Joint Committee 10 months ago.

As you know, President Eisenhower participated in the groundbreaking ceremonies last September 6 for the Pressurized Water Reactor powerplant at Shippingport, Pa. This plant is being built by the Duquesne Light Co. and AEC on a cost-sharing basis. Excavating is underway for the building to house our Sodium Reactor Experiment being built at Santa Susana, Calif., by North American Aviation, also on a cost-sharing basis. Architectural and engineering work is near completion at the Argonne National Laboratory near Chicago for the site of the Boiling Water Reactor. Argonne also is in the midst of preliminary work for construction of a Fast Breeder Reactor, and at Oak Ridge, work is progressing on a second and larger experimental homogeneous-type reactor.

Private groups are making plans to build their own research reactors. One such research reactor already is in operation at North Carolina State College and similar reactors are underway at the University of Michigan and Pennsylvania State University. The University of California at Los Angeles has plans to build and operate a reactor especially designed for medical therapy and research. Other educational institutions, research organizations and industrial firms are actively considering research reactor projects. It is evident that much progress has occurred in the past year in this field.

The use of reactors in medical therapy and research is making impressive contributions in the battle against disease. About 2 years ago, it became apparent that especially designed medical reactors were needed. As a result, at least two designs for such medical reactors are now available, both of the water-boiler type and both providing considerable versatility.

The Commission has approved for inclusion in the fiscal year 1956 budget an item for the construction of a medical reactor at Brookhaven National Laboratory.

At this point, I should like to speak about the Commission's progress in drafting regulations to implement the provisions of the Atomic Energy Act of 1954.

Most of the basic regulations are in draft form. However, we are proceeding with reasonable caution in an effort to keep requirements at a minimum consistent with the new act. We are setting up conferences with industry in order that representative companies in the affected indusries can help us in this important task. Such advice and assistance is being sought so that many of the difficulties can be resolved informally and in advance. It should be pointed out, however, that conferences with industry will not be a substitute for an opportunity to the general public to comment on any regulations before they are actually placed in effect. Such opportunity for public expression will be afforded through the issuance of notices of proposed rule-makings.

On August 30, 1954, when the new act became effective, the Commission issued two interim orders continuing in effect the existing licensing regulations. Since then, the Commission's staff has made substantial progress on a new set of regulations covering (1) distribution and use of special nuclear material; (2) production and utilization facilities; (3) operators' licenses; (4) radiological health and safety; (5) security; (6) control of source materials; (7) control of byproduct materials; and (8) administrative rules and procedures.

In addition to the important steps already described to provide the necessary foundation for industry participation, the Commission has established basic schedules of prices and charges. These include the prices which the AEC will pay for special nuclear material produced by licensees, the period for which the AEC will guarantee the price, and the charges which licensees will pay for materials and services for which the AEC is the only source of supply.

Before leaving the subject of licensing, we should like to refer briefly to two problems which, despite the optimism we have expressed, may tend to deter industrial participation, particularly in the power reactor area. It is as yet by no means clear whether industry can obtain public liability insurance from private insurance carriers in amounts that are reasonably sufficient to cover reactor hazards. We are currently in the process of clearing representatives of the casualty insurance companies of the industry so that they can study available AEC data and come up with a sound insurance judgment. A second possible problem may arise out of the 7-year limitation on the period for which AEC can guarantee prices for privately produced special nuclear material. This limitation may create difficulties for licensees in obtaining financing at reasonable rates.

It is possible that further study and experience will indicate that the solution of one or both of these problems will require legislative action.

Aside from the nuclear power program, another phase of the industrial application of atomic energy which continues to expand in ever-widening scope and usefulness is the use of radioisotopes.

More than 1,200 industrial firms are using these radioactive byproducts to make production jobs easier, faster, and cheaper and to improve the quality of their products and services. Well over 50 percent of all new applications for use of radioactive materials come from industrial establishments.

I will not dwell here on the medical use of radioisotopes, except to state that they are now a standard facility in 843 hospitals, medical schools, and clinics and to add the cheerful report that many hopeful

new applications are coming into use. One has to be a member of a family or household into which disease has come, to fully appraise the importance of the contribution to the art of healing that in certain areas, atomic energy has already brought to the alleviation of human suffering.

In American industry, the savings through use of a great variety of isotopes is currently estimated at more than $100 million a year. Approximately one-third of this annual savings is accounted for by use of radioisotopic thickness gages for quality control in the manufacturer of such products as paper, rubber, leather, textiles, sheet metals, and plastics. Another one-third of the savings is accounted for by radiographic inspection or testing of castings and welds. New applications are being developed constantly. For example, among the promising new uses is a method for rapid chemical analysis of the carbon and hydrogen content of petroleum fractions through use of isotopes. Encouraging progress is occurring in the experimental use of radioactive materials to pasteurize and preserve foodstuffs and pharmaceuticals.

In the agricultural industry and plant physiology, nuclear radiation is finding many beneficial applications. The same is true in the field of animal husbandry.

Distribution of radioisotopes is made by the Commission and by private firms operating under a form of Commission control to insure radiological safety. To date, more than 53,000 shipments of isotopes have gone to 2,400 different American industries and institutions and 3,100 shipments have been made to 46 foreign countries. I think those are impressive totals.

In the year 1954 a total of 11,400 shipments were made, domestically and abroad. As an example of the increasing use of isotopes, the recipients of last year's shipments included 492 new users, nearly half of them industrial.

A new $200,000 plant for processing radioiodine is being constructed to meet the foreseeable needs for this material during the next 5 years, since the major part of the present production of 25 curies a week is required for medical research. New facilities also are being designed for the separation of fission products from spent reactor fuel elements at a contemplated rate of 200,000 curies per year.

As the gentlemen of this committee are so well aware, the Government frequently in the past has accepted the responsibility for the costly pathfinding toward new knowledge, and so it is with atomic energy. Nuclear power is a reality, much sooner than most of us would have dared to predict only a few years ago. We have all seen the pictures of the submarine *Nautilus* standing out to sea, under nuclear power. She was only an idea 6 short years ago.

Still, low-cost competitive power for our homes and industries, from nuclear reactors, is an ambition and a challenge, rather than a reality. The Commission's civilian power reactor program is directed purposefully, and on the part of the Commission's staff, may I say enthusiastically, to achievement of that goal. We are steadily acquiring a larger store of technical knowledge and experience. Our military reactors program, undertaken with the inspiring cooperation of the armed services, has contributed greatly to that knowledge. The work on naval and aircraft reactors and the Army package power project are providing more facts and more experience.

With American industry contributing its vast resources and ingenuity, under the provisions of the Atomic Energy Act of 1954, the Commission's search for cheaper and ever more efficient reactors will move aggressively ahead.

Now, Mr. Chairman, that is the conclusion of the introduction. We had hoped if satisfactory to you, sir, and to the committee, to present in accordance with the plan which we received under date of the 19th, a series of topics. Are you satisfied to move on into the beginning of the next statement?

Representative PRICE. I wondered, Mr. Chairman, if Dr. Libby was going into a detailed presentation.

Dr. LIBBY. I think my presentation will take about 15 minutes.

Chairman ANDERSON. If there is no objection, I think we should go on to the specific statement.

Senator HICKENLOOPER. I would have some questions that I would like to raise to the introduction, but I would just as soon wait until after the whole presentation is through, and I think it would be more orderly, perhaps.

Senator GORE. I would like to ask one question, but if the Chair wishes to go ahead it is all right. I would like to ask one question at this point, if it is all right.

Chairman ANDERSON. Certainly I am not going to bar you from it, but I thought if we could get through a specific subject it would be fine. If you have just a question, go ahead.

Senator GORE. Let me ascertain, will there be further coverage of the clearance of study groups and their representatives to the access of secret material?

Mr. STRAUSS. It is the next subject, sir.

Chairman ANDERSON. Dr. Libby, will you proceed.

Dr. LIBBY. The subject is The Old and New Relationships Between AEC and Industry.

The first part of this statement has to do with the study agreements.

Industrial participation in power reactor development through study agreements was initially approved by the Commission in December 1950.

At the present time, the following 19 agreements have been executed:

American Machine & Foundry
The Babcock & Wilcox Co.
Bendix Aviation Corp.
Bethlehem Steel Co.
Atomic Power Development Associates (Detroit Edison Co.)
Foster Wheeler Corp.-Pioneer Service & Engineering Co.-Diamond Alkali Co.
General Electric Co.
Monsanto Chemical Co.
Newport News Shipbuilding & Dry Dock Co.
Northwest Utilities Group
Nuclear Power Group
Pennsylvania Power & Light Co.
Tennessee Valley Authority
The Vitro Corporation of America
Westinghouse Electric Corp.
Kaiser Engineers, division of Henry J. Kaiser Co.
Rocky Mountain Nuclear Power Study Group
Consumers Public Power District (Nebraska)
Duquesne Light Co.-Walter Kidde Nuclear Laboratories

Chairman ANDERSON. Do you think at a later date you could supply dates for the times these contracts were executed?

(The information referred to will be found on p. 52.)

Dr. LIBBY. Yes; I will be able to do that.

The Commission has approved execution of an agreement with the National Rural Electrification Cooperative Association just recently.

Seventy-one organizations are participating through the agreements currently in effect. These organizations represent several different types of industries. The organizations are grouped by industries as follows: Utilities, 45; equipment manufacturing, 10; engineering and construction, 9; chemicals, 5; shipbuilding, 2.

At the outset of the program, the participants' interests were primarily in the evaluation of the prospects of using atomic energy for both central station electric power generation and the production of special nuclear materials, either from the viewpoint of prospective owners, or from that of prospective designers and builders of atomic powerplants. More recently, however, participants have joined the program whose objectives include the manufacture of reactor components or auxiliary equipment, the design and construction of package power and research reactors, fuel preparation and chemical or metallurgical processing of spent fuel elements, and merchant ship propulsion.

Results: Only 12 of the study groups have participated for a sufficient length of time to have made significant progress. The accomplishments of these groups, considering the newness of the technology, the complexity of problems encountered, and the relatively short time the studies have been in progress, have been considerable. All the groups including utilities and several of the others have made evaluations of various types of reactors. Several have developed useful comparative evaluations based on common ground rules. Probably half of the groups have already acquired sufficient know-how to be potential builders or operators of nuclear powerplants.

A number of the groups have developed designs or otherwise shown interest in building research or package-power reactors, and eight participants bid on the Army package-power reactor. Three of the groups have undertaken substantial design and development programs, representing a start toward assumption of responsibility by private concerns for technological advance heretofore conducted solely by the Government. Four of the concerns with individual agreements and several members of other groups are interested in becoming suppliers of reactor components or auxiliaries.

Two of the groups have worked very closely with the Commission laboratories in connection with projects under the Commission's 5-year power-reactor development program, and several others have provided substantial assistance to the laboratories on specialized problems of power generation. Two groups have developed reactor data for special applications, merchant ship propulsion and emergency power sources. One organization has initiated a comprehensive evaluation of the prospects of simplification and standardization of reactor components.

The general objectives of the program, as stated in the study agreements, have been:

1. Determining the engineering feasibility of designing, construction, and operating reactors, for the production of power, or of power and materials.

2. Examining the economic aspects of nuclear powerplants.
3. Determining the research and development required.
4. Making recommendations to the AEC concerning use of nuclear power and industry's role in carrying it out.

In general, satisfactory progress has been made toward these objectives. Most of the groups which have been in the program long enough have accomplished more with respect to the first two than the others. The study-group program has, however, proved to be an effective means of collaboration between the AEC and industry for working toward the common goal of commercial utilization of atomic energy. The interests of the study groups, and the Commission's contacts with them, have aided in shaping AEC's 5-year program, and in developing plans for further atomic-power development such as the Power Demonstration Reactor Program. The groups have also stimulated those working on power-reactor projects in the AEC laboratories by providing concrete evidence of industrial interest in the use of atomic power.

The chief accomplishment of the industrial participation program has been that a considerable segment of industry has acquired familiarity with reactor technology through having access to the information developed by AEC, providing a broader base for its civilian application as the prospective economy of nuclear power improves. Accompanying this has been the preparation of a fairly sustantial body of data by the participants which, while mostly paper studies, constitutes information available to the Government and others interested at no cost.

COSTS OF THE PROGRAM

The estimated costs of the study-group program to the Atomic Energy Commission, from its inception in 1951 to the end of fiscal year 1954, were $344,000. This includes $97,000 for providing 364 new security clearances and 733 extensions of clearances. Physical surveys of participants' installations, conducted to evaluate their security facilities and procedures, cost the Commission approximately $2,000. The estimated costs of meetings and consultations with contractors arranged for the groups was $60,000. The costs of publication and distribution of documents supplied to the groups was estimated at $20,000. Thirteen reports prepared by the groups were reproduced and distributed among contractors, other groups, and AEC staffs at a cost of $3,000. Estimated costs, incurred by AEC personnel related to administration of the program, were $161,000.

By contrast, expenditures by the study groups for the same period are estimated at $4,900,000. These costs have varied widely according to the varying lengths of time the different agreements have been in effect, the size of the groups, and the scope of their interests. One of the groups had spent well over $2 million by June 30, 1954, and another over $1 million. The costs incurred by the others ranged downward to less than $100,000 each for 5, which by that date had been participating for less than a year. It is estimated that in the past 6 months the groups have spent over $3 million, bringing the total expenditure to more than $8 million.

THE NEW PROCEDURES PLAN

Subsequent to enactment of the Atomic Energy Act of 1954, we have been reviewing the industrial participation program and giving consideration to its revision. The passage of the act has resulted in substantial stimulation of interest not only by the types of industry already participating but also by others such as—

1. Federal agencies, other than those engaged in power operations, but whose assigned functions justify an interest in atomic power.
2. Associations with nationwide membership and interest in commercial applications of atomic energy.
3. Insurance companies concerned with underwriting the risks of privately operated reactors or related facilities.
4. Financial organizations contemplating financing privately owned reactors and related facilities.
5. Universities and colleges engaged in research in reactor technology.
6. Consulting, engineering, or research organizations providing services to others interested in the commercial aspects of this field.

Provision for access to information by the latter group is particularly important in order to permit civilian use of reactor technology to develop in accordance with usual industrial patterns.

Experience has indicated the need for greater simplification of arrangements to enable an increasing number of organizations to make at least preliminary evaluations of the commercial prospects of atomic energy. The need for diversity in arrangements is quite apparent. A considerable number of organizations will want to explore the field to determine whether some part of it offers attractive prospects for commercial activities. Others will have identified particular portions, whether they be construction or operation of power plants, fabrication of research reactors, manufacture of components or auxiliary equipment, or chemical processing operations, and will wish to make more detailed studies and perhaps undertake some research and development. Some are now ready, and others soon will be, to engage in engineering or management consulting, research and development, manufacturing, or operations on a commercial basis.

The Commission is therefore establishing three types of agreements for industrial participation. The procedures for negotiating and administering these agreements are now being developed.

One type, called Access Agreements, will provide access to information on reactor technology, which is classified Confidential—Restricted Data. These agreements will make available the information required for at least a limited evaluation of one or more aspects of nuclear reactor systems or the commercial aspects of supplying or servicing a commercial atomic energy industry. These agreements will also permit complete evaluations of those phases not involving Secret—Restricted Data. Only "L" clearances will be required under these agreements. The agreements would have a term of not longer than 1 year, and be renewable if justified by the future plans and interests of the participant.

Another type, the existing Study Agreements, will be continued to provide information to those who need a more complete evaluation

involving access to Secret—Restricted Data. They will retain essentially the same form as the present agreements, but will require more specific identification of the studies contemplated, including plans for experimental work. They will require somewhat more frequent and complete reports from the participants than the Access Agreements. "Q" clearances will be provided for only those employees whose assignments necessitated access to Secret—Restricted Data.

The third type, Commercial Agreements, will provide access to Confidential—Restricted Data, or Secret—Restricted Data, as required, to those actually engaging in commercial activities involving reactor technology, as opposed to those merely evaluating its prospects. It is expected that in most cases access to confidential information will suffice and only "L" clearances will be required.

The requirements of many organizations engaging in commercial work may be met through the licenses to be issued by the Commission, but it is anticipated that some organizations, such as those engaged in providing consulting services, will not require licenses, and that others will be licensed for only a part of the activities in which they wish to engage.

Reports will be required containing sufficient descriptions of the organizations' work to enable the Commission to appraise the continuing need for access to classified information. Information contained in these reports regarding confidential aspects of the participants' operations will not be disseminated by the Commission. To require such disclosure would deter participation and be counter to the objective of commercial development of atomic energy in accordance with normal industrial practice.

While the costs incurred to date by the Commission in conducting this program have not been excessive, it is realized that the expanded program will result in a considerable increase in these costs. Agreements entered into hereafter, and renewals of existing agreements, will therefore provide for charges to participants for certain readily identifiable costs, such as those incurred in processing security clearances, reproduction and handling of technical publications, and services provided by AEC laboratories at the specific request of participants. A specific schedule of charges is now being developed in connection with the establishment of procedures for negotiating and administering the agreements.

The next subject is Information for Industry. Classification policy for many years has been expressed by means of guides, which are used by operations offices, laboratories, and reviewers. The general Declassification Guide has just been revised, and recently approved by the Commission. The major change in this guide has been the authorization of a so-called "gray zone" of information classified Confidential—Restricted Data. This "gray zone" includes almost all of the classified power reactor technology and most of the classified nuclear and basic scientific data. It does not include information critical to production technology or to military application.

The Atomic Energy Act of 1954 provides for continuing review of Restricted Data in order to determine which data can be declassified. Usually the declassification action will be carried out by the Washington Division of Classification, as it has in the past. However, to make information available to industry more quickly, pro-

vision has been made for the establishment of Classification Committees in the various operations offices.

"L" CLEARANCES

An important factor in the process of making more information available to industry is the "L" clearance program established pursuant to the authority granted under section 145 f of the 1954 act. Persons receiving an "L" clearance may have direct access to Restricted Data classified "Confidential" and under prescribed conditions may be permitted to see buildings and equipment classified no higher than "Secret." Experience to date, some 800 cases in November and December of last year, indicates that such clearances may be processed in about 21 days in contrast to the 7- to 8-week period required for "Q" clearances. Additionally the administrative and financial savings from the use of the "L" clearances will permit a more rapid expansion of the groups participating in industrial programs.

An "L" clearance is granted on the basis of a National Agency Check, which embraces a review of the criminal and subversive files of the Federal Bureau of Investigation, the files of the Civil Service Commission and of the House Committee on Un-American Activities, and such other governmental records as may be deemed appropriate. In event these reviews produce "substantially derogatory" information, as defined by the AEC Clearance Criteria, a full background investigation will be initiated. The Civil Service Commission will conduct the investigation if the derogatory information concerns character defects and the Federal Bureau of Investigation will investigate those cases involving questions of loyalty. The necessity of instituting a full field investigation in cases containing derogatory information of a less serious nature will be determined by the AEC after consideration of all available data. The procedures established for the "L" clearance program embody the appeal, administrative review, and hearing features of the "Q" clearance system.

Persons whose participation in the program requires access to Restricted Data of a higher classification than that permitted under the "L" clearance program will continue to be processed for "Q" clearances.

INDUSTRIAL INFORMATION SERVICE

Passage of the Atomic Energy Act of 1954 stimulated industry's already considerable interest in the possibilities of the atom for peaceful purposes. Before enactment of the 1954 amendments, the Commission's information-for-industry programs were necessarily limited to unclassified areas. While these information programs contributed to scientific and industrial progress in many fields—basic research and the use of radioisotopes are two clear examples—they did not provide, because of classification problems, the technical information essential to the sustained growth of a normal, competitive nuclear power industry. To start this new industry, the Commission, under the authority granted by the new act, will operate 2 information-for-industry programs—1 unclassified and the other classified.

THE UNCLASSIFIED PROGRAM

Since its inception, the AEC has tried, wherever possible, to disseminate program-developed information through regular channels of communication. Indeed, few engineering and business papers can be found today that do not carry at least several articles a year on some phase of the atomic energy program. A considerable part of the load of disseminating technological information originating in AEC facilities is placed on the operating contractors of the Atomic Energy Commission. To assist in this function, the Commission has enlisted the advice and support of outstanding members of the industrial press and professional engineering societies. These men serve without compensation on the Advisory Committee on Industrial Information. The function of this committee is to identify AEC and contractor activities of use and interest to American industry, and to advise the Commission on the capability and desire of industry to utilize such information as may be made available.

In order to make copies of its unclassified reports conveniently available to American industry, the AEC has established four Industrial Information Depositories. These are: The Atomic Industrial Forum in New York; Stanford Research Institute in Stanford, Calif.; John Crerar Library in Chicago; and Georgia Institute of Technology in Atlanta. Each of these depositories is making available to industry, at no cost to the Government, reference and photocopy service of all AEC unclassified research and development reports as well as unclassified mechanical drawings of AEC-developed equipment. The initial group of engineering drawings will soon include all research reactors and associated reactor instrumentation and controls. Supplementing the service provided by the depository libraries, the AEC has completed arrangements whereby the Microcard Foundation, a nonprofit organization, will provide at nominal cost microcards of any unclassified report in the AEC collection. The AEC is adding about 400 titles a year to the list of full-size documents on sale through the Office of Technical Services, Department of Commerce. Currently, 1,128 AEC reports may be purchased through OTS.

The Commission is continuing its program of publishing unclassified versions of the reports submitted by the Industrial Study Team Groups. It is expected that four more of these reports will be published through the Government Printing Office by June 1955.

Special bibliographies separating research and development reports evaluated as being of special interest to industry have been prepared and distributed. Current AEC reports of industrial interest are abstracted and printed in Nuclear Notes for Industry, which is distributed free upon written request to the Commission. A brochure entitled, "A Business Man Asks—How Can I Keep Up With Atomic Energy Developments?" was prepared for the newcomer to the atomic energy business and is available upon request from the AEC.

THE CLASSIFIED PROGRAM

One of the principal purposes of the Commission's new Industrial Participation Program is to make available to professional or business interests, information necessary to a realistic evaluation of one or

more aspects of nuclear reactor systems, or to an evaluation of the commercial aspects of supplying or servicing a private atomic energy industry. Under this program, therefore, the Commission will make available to "L" cleared persons the "gray zone" classified technical literature dealing with reactor technology. "Q" cleared persons will have access to more highly classified reports, as well as to these, of course.

Since its beginning the AEC program has generated a substantial body of data on nuclear reactors, much of which has been recorded in some 16,000 classified technical reports which are expected to fall in the "gray zone." New reports as published will increase this number.

Additionally, the following special arrangements are being made to aid in the dissemination of information to "L" cleared persons:

1. A special edition of the Commission's classified abstract journal, Abstracts of Classified Reports, which will enable companies to order only the reports they need.

2. Up-dated editions of the Reactor Handbook (in four volumes: Vol. I, Physics; Vol. II, Engineering; Vol. III, Materials; and Vol. IV, Fuel Processing).

3. Special issues of Nuclear Science and Technology, the Commission's classified journal issued quarterly.

4. A bibliography of the most significant reports in the reactor field.

5. Consideration of the feasibility of establishing classified depository libraries for the use of companies participating in this program.

Companies working under this classified participation program will be required to comply with the Commission's security requirements for safeguarding classified documents. All classified documents will remain the property of the Government and will be returned to the Commission.

Mr. STRAUSS. Mr. Chairman, that is the end of that section.

Chairman ANDERSON. Dr. Libby, I am sure there will be many questions around here. There is one general question I would like to get in here first. We know you are starting this off through the use of power demonstrations and reactor programs, and by the three-contract system of access, study, and commercial agreements.

Just as a general question, how could the Commission possibly have gone any farther toward tying up the industry than by these contract systems decided upon? Why do you use the agreement contracts instead of the license system, which is set forth in 101, 102, and 103, and particularly 104 (a), (b), and (c) of the act?

Dr. LIBBY. Perhaps I should defer this question to my colleagues, but the agreements are for study. The access and study agreements involve no actual operations except paper studies.

Chairman ANDERSON. But they tie the private and non-AEC groups just as tight as possible to the AEC, whereas we thought it was the meaning of the act—certainly the Congress seemed to intend—that by licensing they would give an opportunity for private industry to begin to work separately from the control and absolute domination of AEC. Why did you decide on this agreement method, instead of making use of the licensing method?

Mr. STRAUSS. May I attempt to answer that, Mr. Chairman?

It is conceivable that the majority of these companies that enter these study agreements may never become licensees.

Chairman ANDERSON. It is also conceivable that if this works, nobody will become a licensee.

Mr. STRAUSS. I hope that will not happen as a result of this. Many of these people will be suppliers of instruments, builders of small parts for which no license will be required.

Chairman ANDERSON. Do you regard this as almost a complete reversal of the statute?

Mr. STRAUSS. No, sir. I regard it as supplementary. This is to acquaint people in the industry, people who do not know whether they will apply for a license or not—those who, for example, apply for access agreements will include many firms that have absolutely no idea at all whether there is any place for them in the atomic-energy industry.

Chairman ANDERSON. If they decide that there is a place for them, they will have to come to you for a contract of some kind, rather than a license.

Mr. STRAUSS. No; they may come for a license instead of a contract.

Senator PASTORE. Has anyone applied for license yet?

Mr. STRAUSS. I believe there have been applications for license. I would like to refer that to the General Manager.

Mr. NICHOLS. We have some people indicating that they want to know how to get either a license or a way to proceed with a separate reactor.

Senator PASTORE. Many, or 1, 2, 3?

Mr. NICHOLS. It is difficult. I have heard some of these informally and some by letter, but I would say 2 or 3 that have asked. One passed my desk the other day of a man wanting to know how he can practice insurance, because he needed a license. The next chapter that we are covering here will cover licensing. I think, Mr. Chairman, it will cover in part your question that we do intend to issue licenses. If anyone wants to build a reactor, they would not do it under a study agreement. They would need a license even under the power demonstration program.

Chairman ANDERSON. But in order to get hold of any information they have to have a contract, study or otherwise, with the AEC. Why would it not be possible for a person who just wanted to work in this field to get a clearance and not tie him up with the AEC? Why do you have to have your hands on him?

Mr. NICHOLS. Actually, on an engineering consultant, we plan to give him a license.

Chairman ANDERSON. Without a contract of any kind? Where do you provide that?

Mr. NICHOLS. Actually, on our licenses, we have still some distance to go.

Chairman ANDERSON. We are on clearances for just a minute. Where do you provide that a man can get a clearance unless you give him a contract.

Mr. NICHOLS. Nowhere, at the present time.

Chairman ANDERSON. That is right. He has to come to you to get a contract before you clear him for any information. Therefore, you have your hands on him at all times.

Mr. NICHOLS. We need some type of agreement as to what he does with the information.

Chairman ANDERSON. In other words, if a man wants to work in this field and shows that his firm is a fine firm, he cannot get clearance to get anything unless he makes some sort of contract with you so you can keep hold of him, is that right?

Mr. NICHOLS. It is not the complete intention here when we get the licensing system going, but it is at the present time.

Chairman ANDERSON. That is the complete effect at the present time.

Mr. NICHOLS. At the present time I think that is correct, but that is not the intent.

Chairman ANDERSON. Nobody can get a clearance unless he comes to you and gets a contract.

Mr. NICHOLS. That is not the intent as soon as we set up our licensing procedure. These papers are now passing my desk going to the Commission for consideration, and we have a group working on it which will be covered in the next chapter. I think you are 100 percent right, that ultimately you would hope to pass all this out through a licensing system.

Chairman ANDERSON. That is why I asked if this was not exactly contrary to the Atomic Energy Act, which we just finished passing, which provides for the issuance of clearance, regardless of whether a man has a contract or not.

Mr. NICHOLS. This is the extension of the study agreements with a continuation of a practice under the old act that we broadened to cover the immediate future here, until we can get into a real licensing program.

Chairman ANDERSON. The provision of the law is that you may require such pertinent information to, one, prescribe such regulations or orders as it may deem necessary to protect the restricted data received by any person in connection with any activity authorized pursuant to this act, and so forth and so forth. It does not say in order to make a man come and take a contract so you have your hands on him in the business as long as it exists. Where do you get the conception of the law——

Mr. NICHOLS. We do not have that conception, sir.

Chairman ANDERSON. But it is the practical effect of what you set up, isn't it?

Mr. NICHOLS. Not what we are planning to set up.

Chairman ANDERSON. But thus far.

Mr. NICHOLS. Yes. We have not completed all of the studies that are necessary to go into how you do interpret this act. We have set up as will be explained in the next chapter here that we have an individual, and a group working on all the licenses, and those are going through the stage. The first one will be on the Commission's agenda this week if we can find places here to handle it. That will be the first of the licenses.

For example, on the operator's license, that happened to be on my desk this morning. We are taking each one of the various provisions and setting up the procedures. They will also be coming over to the Joint Congressional Committee. We are not at this stage of the game prepared to tell you exactly how we are going to handle all the problems about licensing. I would say it is still the intent of

the Commission and certainly my intent that we have no desire here to find a different way of doing it than licensing.

Chairman ANDERSON. I will pass to Mr. Cole, if I may.

Representative COLE. Mr. Chairman, I was only going to make an observation in connection with the point which the chairman has raised. It seems to me that the procedure the Commission has followed with respect to making contracts for these study groups, composed of people who simply want to inquire to what extent they may be in a position to later on apply for a license to carry on a research project, is the proper procedure to be followed. I don't envision that the law expected the Commission to grant a license, willy-nilly, to anybody who might come in and say, "We want to build a research reactor." This is simply, as I view it, paving the way toward the day when X study group or one of its members may through that study discover a way in which it might make application for a license to carry on a research project, which would involve the use of nuclear material or the use of a nuclear reactor.

Representative DURHAM. Will the gentleman yield at that point? Hasn't the Commission already established the agreements?

Representative COLE. I do not understand that to be the effect of the study agreements. If it is, then that is a different color.

Chairman ANDERSON. Will you answer that comment?

Mr. STRAUSS. As I read the section of the act, section 101, chapter 10, Mr. Chairman, it seems to me clear—it is short:

> It shall be unlawful except as provided in section 91 for any person in the United States to transfer or receive in interstate commerce, manufacture, produce, transfer, acquire, possess, import, or export any utilization of production facility except in accordance with the license issued by the Commission.

Representative DURHAM. Before we get into that, I asked a simple question. Do these agreements with the individual bind the individual on the basis of securing the license, and you tell him what he can do under the agreement? Then if he changes or has some basic research problem, he has to come back to you for another agreement under the license; am I correct?

Mr. STRAUSS. Mr. Durham, I will try to answer it. My understanding, for example, if an instrumentmaker wishes to find out whether his plant is capable of making instruments on our control panels, he executes one of these access agreements.

Representative DURHAM. A study agreement.

Mr. STRAUSS. Which is the one thing that gives us the chance to run a file check on his personnel. There is no license involved in that at all. It might be interesting to you to know that there are over 1,100 small firms now engaged in some form of the supply of material or offering material, at any rate, for such purposes, and there are no licenses involved in those cases at all.

Representative DURHAM. But you sign an agreement. He has reached an agreement with you as to how far he can go and that is an agreement just the same as a license?

Mr. STRAUSS. Not in the case of the people I have just referred to. The only agreements that have been made have been these 19 which were read by Dr. Libby a few moments ago.

Mr. NICHOLS. I think page 9 of this text indicates the commercial agreement that we expect—both the license and the study.

Chairman ANDERSON. The section that the chairman read says nobody can do any of these things except in accordance with the license. You read the license to be an agreement or contract with you. The whole difference is whether you are going to license freely or whether you are going to make them come to you in partnership agreements. That is the whole concept. The word is "license" in the law, but "contract" in your mind.

Mr. STRAUSS. These people don't know whether they are going to be engaged in the utilization of production facilities in connection with atomic energy. They can't tell until they look. Why should they be licensed?

Chairman ANDERSON. They cannot look until you have them under your thumb with an agreement.

Senator PASTORE. Why don't you tell us, Mr. Chairman, what the agreement involves? How are they tied up or what freedom of action do they have? What is contained in these agreements?

Mr. STRAUSS. Perhaps the General Counsel can give us an idea precisely of what is in the agreement.

Mr. MITCHELL. I would like to make one point first, Mr. Chairman, if I might. There is no provision in the law for issuing the license where the only activity involved is obtaining information. Our licenses are authorized where production or utilization facilities are involved, where special nuclear material is involved, or source material, or distribution of by products or operators. If the only thing that the concern wants is to come and get information from us, then there is no provision in the law that authorizes us to issue a license.

Chairman ANDERSON. But there is something about information in the law.

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. 141 (b) says you shall be guided by the following principles:

> (b) The dissemination of scientific and technical information related to atomic energy shall be permitted and encouraged so as to provide for free interchange of ideas and criticism which is essential to scientific industrial progress and public understanding, and to enlarge the fund of technical information.

You are going to make a man sign an agrement before you give him away.

Mr. MITCHELL. I would like to call your attention to the opening part of that section which says that it shall be the policy of the Commission to control the dissemination and declassification of restricted data in such a manner as to insure the common defense and security.

Chairman ANDERSON. Then you believe the agreements are necessary for common defense.

Mr. MITCHELL. As a security measure; yes, sir.

Representative COLE. There is nothing in the law that gives the Commission authority or encourages the Commission to disseminate restricted data; is there? It is with respect to access to restricted data that you make these study agreements?

Mr. MITCHELL. That is right, sir. We are charged subject to the paramount consideration of security to make restricted data available for the purposes stated in 141. But we have to first look at security.

Representative HOLIFIELD. I do not quite understand the line of questioning, but it seems to me that it would be necessary for you

to have an agreement or contract with these people who have access to restricted information where they would agree not to reveal that restricted information to others, and where they would agree to use it for legitimate purposes.

Mr. MITCHELL. That is exactly the point, sir.

Representative HOLIFIELD. I think you are completely within your rights, and you should have a contract.

Mr. MITCHELL. Actually we are required to do so.

Representative HOLIFIELD. I think you are right about the law. It is not a license that they want.

Mr. MITCHELL. No, sir.

Representative HOLIFIELD. It is the control of information preceding the decision on their part as to whether they will apply for a license.

Mr. MITCHELL. That is exactly right.

Representative DURHAM. We are right back under the old law.

Mr. MITCHELL. No, sir; I don't think so.

Representative DURHAM. I do not see it.

Mr. MITCHELL. This is an extension of what we were doing under the old law.

Representative HOLIFIELD. It is permission for you to go ahead and let people have access to restricted information which you did not have the right to do before.

Mr. MITCHELL. That is right.

Mr. NICHOLS. The next step would be after they had the information to get a license to use it.

Representative HOLIFIELD. That is right.

Mr. MITCHELL. Possibly they may never go to a license.

Representative HOLIFIELD. Or they may decide to go into the business of a consultant and advise others how to proceed.

Mr. MITCHELL. That is exactly right, sir.

Representative HOLIFIELD. I see nothing wrong with it myself.

Mr. NICHOLS. Unless you completely declassify all industrial information, you need some device such as this to control it so you know what is happening to the information, know what type of provisions they are using to safeguard the information, and to know who they can pass the information on legitimately, so that it is still protected. But once they decide to use it in a reactor or some commercial activity that involves the provisions that the law requires a license for, then they go into a license. Once an outfit has a license, it is perfectly possible and probable that they may not need this study agreement.

Representative VAN ZANDT. General Nichols, does this practice somewhat parallel a practice now in effect, as far as the Department of Defense is concerned, in the allocation of classified information to a potential bidder?

Mr. NICHOLS. It is not as formalized as in AEC, because we have a more rigid law. But certainly there were cases in DOD where we have cleared certain individuals and firms to give them an idea of what the problem is by using cleared personnel to study a problem that comes up with a proposition.

Representative HOLIFIELD. The only danger I see to this is that you should not be discriminatory in signing these contracts to cleared people, "L" cleared or "Q" cleared people. If there is a discrimination in granting these contracts to these chosen people——

Mr. STRAUSS. First come, first served.

Representative HOLIFIELD. That is right. Then you would be using your contractual authority to restrict.

Representative COLE. Have you denied permission to make a study that has been applied for by any group or individuals?

Mr. STRAUSS. There may have been people who have come up with a request for a study contract which has not been granted because it may have been considered frivolous by the staff, but I don't know of any such situation.

Representative VAN ZANDT. Admiral, are there any limitations that you would apply as to the number?

Mr. STRAUSS. There is a limitation based on the size of our staff to take care of it. This takes a great deal of time and people to sit and talk and correspond with these people. The time may come when we will be over our heads.

Representative DURHAM. What are the agreements that you are operating under? You say you have been making some agreements or talking about them.

Mr. NICHOLS. We gave a list of the existing ones that covered power.

Mr. STRAUSS. We would be glad to submit the actual agreements themselves.

Representative DURHAM. The actual agreements is what I want to see, to see how they do operate.

Mr. STRAUSS. Copies will be brought here tomorrow, sir, if you wish. Would you like all of them or specimens?

(No response.)

Senator PASTORE. Is the Commission encouraged by the reaction on the part of private industry to participate in this program as we anticipated and debated when the act was proposed and enacted?

Mr. STRAUSS. Senator Pastore, it is a matter of opinion. I am encouraged by the caliber and number of institutions within the short time since the passage of the act. But someone else may quite justifiably be of a different opinion. I am encouraged by it.

Senator PASTORE. When you say the number of institutions, could you give us a more particular statement?

Mr. STRAUSS. Yes. The 19 agreements which are listed are in a number of cases composed of groups. It may be possible that someone here can give us the information.

Mr. NICHOLS. 71.

Mr. STRAUSS. 71 companies, cooperatives or whatnot, are represented in those 19 agreements.

Senator PASTORE. And you see these as potential licensees?

Mr. STRAUSS. Yes.

Senator PASTORE. Not all, but some.

Mr. STRAUSS. Some.

Representative KILDAY. Will the Senator yield?

Senator PASTORE. Yes.

Representative KILDAY. All these companies have come in since the passage of the act.

Mr. STRAUSS. No, sir; a good many were raised before that.

Senator PASTORE. I asked since the passage of the act.

Mr. STRAUSS. Sir, I have no cutoff date, and I can't tell you offhand.

Chairman ANDERSON. That is why I asked that we be furnished the date on these contracts.

Mr. STRAUSS. I will be glad to do that.

(The information referred to will be found on p. 52.)

Representative HOLIFIELD. I wanted to explore further the point I raised. I think you have to go about this by way of contract as you are doing. That is not the important point, as I see it. The important point is that your contracts and agreements to have access rest upon having been a member of one of these study groups. The criteria that you set up which makes it possible tc sign a contract with you, in my opinion, and your cutoff date of April 1 is a procedure——

Mr. STRAUSS. The cutoff date of April 1 has to do with the power reactor demonstration program.

Representative HOLIFIELD. Even then, to get into a Power Reactor Demonstration Program, you know between now and April 1 you cannot even get "Q" clearance for people. Therefore, the only people that are available to enter into this Power Reactor Demonstration Program, as I see it, are people who have heretofore been in these study groups, have had their "Q" clearance, have had access to restricted information and they are the only ones that I can see that can go into this Reactor Development Program.

Mr. STRAUSS. Mr. Holifield, I think I can explain that to you. There is nothing magic about the date of April 1 except a deadline to get applications in.

Representative HOLIFIELD. That is mighty important.

Mr. STRAUSS. If you have read our statement carefully we anticipated that that date might have to be set back further if enough did not come in by that time. There is no reason in the world that the Commission will not have—as a matter of fact, we stated at the time we set that date—that there would be other opportunities. Some kind of a deadline has to be set to get anything in. Otherwise, the people who might want to participate would defer indefinitely.

Representative HOLIFIELD. But, sir, you have set a deadline which makes it impossible for a lot of people to utilize this privilege or to have access to this privilege of the Reactor Development Program, because the very criteria which you require is that they shall have certain knowledge, that they be willing to put up $100,000, and certain other things like that. This is what I am interested in, the justification of your shutoff date.

Mr. STRAUSS. It will not be the last opportunity by any means.

Representative HOLIFIELD. I hope not. If it was your April 1 deadline would set a complete monopoly on participation. I am not so sure but that it does under the circumstances for some appreciable time which will give to these people that have been in these study groups, and that you have contracts signed with before the law was passed a jump on all the rest of these people. It will almost amount to exclusively licensing that group.

You use the term "enough." You said in order to know when we get enough in; where is the "enough?"

Mr. STRAUSS. That would be a matter for Commission decision which has not yet been reached. I would hope that our anticipation will be borne out.

Chairman ANDERSON. If the deadline is not a deadline, why is it a deadline. If you are not going to stick to the April 1 date, why did you put it in?

Mr. STRAUSS. Certainly those who get in under that line, Mr. Chairman, will be the first ones considered.

Chairman ANDERSON. For consideration.

Mr. STRAUSS. I would think so.

Chairman ANDERSON. Does that give any advantage to those people who know the process?

Mr. STRAUSS. Inevitably it does. I don't know any way that you can equalize the fact that one man has information and the other doesn't.

Representative HOLIFIELD. I don't either, if you allow enough time for the rest of the people to get this information and to have these contracts of access to information. But if you shut the time off at April 1, you make it impossible for a great many people that a year from now want to participate.

Mr. STRAUSS. I think that is true. I think there are two considerations before the Commission. One is to see the program advanced with the greatest possible expedition. On the basis of absolute equity and without any paramount desire to get ahead with it, one might wait a year, 2 years, 5 years, until the last man could say he knew as much about it as he needed to know.

Representative HOLIFIELD. We do not ask you to wait. Why don't you start granting these contracts to everybody that comes in and leave the door open to them to participate in the Reactor Program?

Mr. STRAUSS. For this reason. It is desirable to help the most deserving of these from the point of view of the benefit to be derived from the project. If you took them only first come, first served, without an opportunity to consider a considerable number of them at one time, you might be helping the less desirable. It doesn't necessarily follow that the best proposal will be the first one.

Representative HOLIFIELD. Who will set up as a judge that some group who may come in after April 1 is not as deserving as some who came in before April 1?

Mr. STRAUSS. That is quite possible. The best of all might not come in for 2 years, but would you wait?

Representative HOLIFIELD. No, sir. I would start giving the right to participate in the reactor development program and I would keep it up as long as deserving people came in.

Representative COLE. May I understand about this April 1? Does this April 1 cutoff date that we are speaking of apply to applications for the formation of study groups in the future?

Mr. STRAUSS. No, sir. This is for the construction of demonstration power reactors.

Representative COLE. This applies to persons who might make application for a license?

Mr. STRAUSS. That is right. I think there is a confusion. These study groups have nothing to do with the cutoff date.

Representative HOLIFIELD. There is no confusion in my mind.

Representative KILDAY. Did you say deserving or desirable?

Mr. STRAUSS. I will have to ask the reporter to read it. I have answered so many questions.

Representative KILDAY. If you said deserving, what would you mean by deserving?

Mr. STRAUSS. Deserving of the Commission's approval, because of the merits of the project.

Representative KILDAY. I think you said deserving.

Mr. STRAUSS. I was sure that you would not misunderstand me.

Mr. NICHOLS. May I make a pertinent comment? We had almost the same problem when we let out the Army package power reactor for bids. We recognized that we were the only people who could bid on the package reactor, people who started the study groups and were in the business in one form or another who could intelligently appraise whether they could build a reactor that would work and sell it to us for a lump-sum price. It is true when we do it on a restricted group you cannot say we have 100 percent equity for all industry in the United States.

Representative HOLIFIELD. We will not get confused on this. That was a specific letting of a contract. You have to have a deadline date for the letting of a contract for a specific project. This is opening the doors of the atomic-energy project for the participation of qualified people. I say you have no right to set a deadline on a general type of access to information and opportunity to participate, providing they can show that they are qualified to do it. I realize you will have to turn down people. But your calendar date in my opinion is the wrong method of controlling the entrance. The method of controlling would be qualified people, even if it is 6 months or 2 years from now.

Mr. NICHOLS. This is partly my brain child, and I will defend it later when we get to describing it. Our thought was to try to find some way to bring industrial participation on a risk basis where they would pick up more of the check. We recognized we did not have a complete broad base where everybody is in it that will be in 5 years from now. We felt we had a broad enough base—I think if you will check the wording of our announcement—we may not take any of these proposals. If they all look as though they really are not good, and there has not been reasonable competition, we might not take any of them.

In any event, we planned we would see how it works for the April 1 deadline. If we do have enough so we feel we have reasonable competition, we would take one or two. In any event, we plant to repeat it again either on a biyearly basis or yearly basis so that anybody who is late would get in the next year or 6 months.

Representative HOLIFIELD. I want to say right now, Mr. Chairman, that I am not much of a believer in April Fool's Day. I do not know whether that has anything to do with the date selected or not. I am going to earnestly protest against the cutting off of opportunity to participate in this program.

Mr. STRAUSS. Touché. I did not realize it was April Fool's Day.

Chairman ANDERSON. Plenty will join in that protest.

Mr. NICHOLS. We may find another reason. Later we discuss the hazard business. It may mean nobody can be in it. We may need a change in the law before we could take any. We felt we would find out what kind of proposals we can get. If they are good enough to where we can say come before this committee and prove we are sound——

Representative HOLIFIELD. In other words, you might need a little more incentive for these overanxious private industrialists that have been champing at the bit to get into the program.

Mr. NICHOLS. You may need some way to take over the overall hazard.

Mr. STRAUSS. That would have been a good reason for not picking March 15.

Representative VAN ZANDT. Admiral, have you any idea how long it would take to process one of these applications?

Mr. STRAUSS. To which are you referring? The study agreements?

Representative VAN ZANDT. No; the application for the license.

Mr. STRAUSS. No, sir. We have had no experience on which to base that. I would like to ask counsel if he has any idea how long such processing might require?

Mr. MITCHELL. I am sorry; this question was directed to which type?

Mr. STRAUSS. To any kind of license for construction of a reactor.

Mr. MITCHELL. I would hesitate to hazard a guess. We will require, of course, an application which will give us sufficient information on which we will have to determine in accordance with the standard set up in the law whether the applicant is qualified or not. Once we arrive at that determination, I would hope that we could issue a license quite promptly.

May I interpose something here, Mr. Chairman, that I think may clarify this whole thing?

There are three types of agreements, broadly speaking, that we are discussing here. The first of them is the category of agreements that has to do with information. Included in this category are the access agreement, the study agreement, and the commercial agreement, which are designed to protect security. That program has started now and it will continue indefinitely. There is no deadline on it.

The second program is the licensing program. This again will start as soon as we can get our regulations out. It will continue indefinitely. There is no deadline on that.

The third program is the power demonstration reactor program, which is a Government contract involving expenditure of Government money. On that one, we did feel we had to set a deadline for submission of proposals.

Representative DURHAM. May I ask a question on that? You say you have three categories. That is just what I thought. But when you reach that licensing period, you will be licensing on the basis of agreements you have signed.

Mr. MITCHELL. No, sir.

Representative DURHAM. What are you going to do?

Mr. MITCHELL. The access agreement, and the license are designed for different purposes, Mr. Durham. After obtaining an access agreement or a study agreement or a commercial agreement, if the applicant decides that he wants to go forward with a project—either he wants to build a factory or he wants to obtain special nuclear material or something of that kind—then he has to come in for a license. The license is a substitute for the earlier agreement.

Representative DURHAM. He has to have the "L" and "Q" clearance on all these agreements.

Mr. MITCHELL. Yes, sir; that is necessary for security purposes.

Representative DURHAM. Then you are still right back where you started.

Mr. MITCHELL. I don't think so.

Chairman ANDERSON. In the statement made there were 19 firms listed here that were in these study agreements. Those agreements were asked for. They are all on file with our committee.

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. They have all been examined by our staff. The details of all these agreements indicate that the privacy of the groups is completely invaded. All the patent rights are made to the AEC, all reports are made to the AEC, only the AEC decides what is going to happen to the reports, if anything. How do you say that is just security? Why is that not a complete violation of the individual's rights?

Mr. MITCHELL. As to patents, I agree there is a further area. I don't think it is quite accurate to say that all patent rights go to the commission under our study agreements.

Chairman ANDERSON. Can we concede all reports go to the AEC?

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. That is part of it.

Mr. MITCHELL. The reporting we considered our return for the expenditures that the Commission was making.

Chairman ANDERSON. In other words, you want to know exactly what anyone of these firms is doing; if they are making any progress at all.

Mr. MITCHELL. We wanted to know what their conclusions were, so we would have this available for ourselves and industry generally. This was our return for our investment.

On the access agreements and the commercial agreements likewise, we feel that some patent provisions are necessary, because we are giving these people classified information.

Representative HOLIFIELD. These contracts were signed under the old law.

Mr. MITCHELL. Yes, sir.

Representative HOLIFIELD. And you were obliged to do it that way. You had to do it that way.

Mr. MITCHELL. Yes, sir.

Representative HOLIFIELD. The field is much more limited now. If you sign new contracts under the new law, you don't have to require all of these provisions.

Mr. MITCHELL. No, sir.

Representative HOLIFIELD. Nor are they bound on the patent basis as much as they were before, because there is a division between all patents and those patents which are important to the technology of the art.

Mr. MITCHELL. I think we will still need patent clauses.

Representative HOLIFIELD. I think you will, too, but not as restrictive as the others.

Mr. MITCHELL. Perhaps not.

Chairman ANDERSON. You say you did not take the patents away?

Mr. MITCHELL. I said not entirely.

Chairman ANDERSON. The language of the Detroit-Dow contract is a royalty-free license.

Mr. MITCHELL. That is in the area of production of, or utilization of, special nuclear materials for atomic energy.

Chairman ANDERSON. This is under the section patents.

Mr. MITCHELL. Yes; but there is more to it than that. As to other areas the contractor gets sole rights except for a nonexclusive royalty-free license in the Government. So we divide them.

Chairman ANDERSON. The license for the Department of Defense would more properly come up after you have made the presentation of that, would it not?

Mr. NICHOLS. I think so; yes, sir.

Chairman ANDERSON. The licensing of power reactors you are going to deal with in your presentation?

Mr. STRAUSS. We have a section on patents.

Mr. NICHOLS. We have a section on patents, also.

Chairman ANDERSON. Are there some additional questions? If not, I had intended at the end of Chairman Strauss' statement to ask if other Commissioners have statements. I know Mr. Murray has a statement. If you want to present it now, we would be happy to have it at this time.

Mr. MURRAY. Mr. Chairman, a little over 2 weeks ago at Groton, Conn., I had the rare privilege of seeing the *Nautilus* back away from the dock on which I stood and move out to sea under atomic power. That historic event signifies that the Navy has entered a new era—and not only the Navy, but all mankind. For symbolically the *Nautilus* represents a promise of the success that can be achieved in the field of industrial atomic power. At the same time it emphasizes that this industrial success can be realized in the immediate years ahead only by a similar all-out effort that is imaginative, bold and—most important of all—vigorous. The United States can be justly proud of the *Nautilus* as a great job well done. The country should be grateful to your committee for its support of this naval project, to the scientists and engineers, to the foresight and persistence of Admiral Rickover, and to all those connected with the naval propulsion program. The *Nautilus* is a tremendous contribution of the security of our Nation and the free world.

Yet our work in the field of nuclear propulsion both for ships and aircraft is just beginning. Already I see the application of atomic power in the Navy gathering increased momentum with each passing day. The building and operating of military reactors will, as they have in the past, hasten the day when economic industrial atomic power will become available to the world.

Your committee has asked for answers to many specific and important questions pertaining to the work of the Commission. In most cases the answers can be definite; in others they are qualified. There is one fact regarding industrial atomic power which I feel should be especially emphasized. Industrial atomic power will come quickly or slowly depending on the importance attached to the program; and the men assigned responsibility for carrying it out. It also hinges on the teamwork between our committee and the Commission. I consider the need for such teamwork to be so important that I fell obliged to call attention to anything that might even remotely impair it. It is for this reason that I draw your attention to issues that have been giving me special concern.

I am of the opinion that during the past year the Commission has lost some of the stature it previously enjoyed. To this extent the past year has been an unhappy one. Yet this unfortunate turn of events

in no way derives from any technical problems on the horizons of atomic energy. On the contrary, it occurred at a time of unprecedented progress both in the industrial and weapons fields. It is tragic indeed that during this time, when our primary concern should have been increasingly devoted to exploiting that progress, altogether too much of our thought had to be devoted to matters which had nothing to do with our primary responsibilities. Our difficulties arose from problems related directly neither to our weapons program, nor to the development of peaceful uses of atomic energy.

One issue, more than any other, in my opinion, has contributed to this unhappy situation. I refer, of course, to the Dixon-Yates controversy. Under any circumstances Commission involvement in an issue so threatening to our mutual understanding would be unfortunate. When one realizes that it relates to an issue, not of our making, and certainly extraneous to the primary responsibilities of our Commission, it becomes doubly so. So damaging has been its effect that something must be done to free the Commission from any connection with this cause for so much discord.

The Dixon-Yates contract has been defended on many grounds. It is argued, for example, that the contract is merely an extension—and indeed an improvement—on a pattern which I established, namely, that of using combinations of private utilities to meet the exceptionally large power requirements at AEC installations. If the comparison were a valid one, I would be the stanchest proponent of putting together the power resources of Middle South and the Southern Co. I say this because, as I have previously testified before this committee, I must accept responsibility for initiating and developing the pattern of which Dixon-Yates is said to be a part. But the argument is a specious one. The Dixon-Yates contract, and the OVEC and EEI contracts, with which it is compared, are similar only with respect to the means of obtaining power. There the similarity ends. The "Ohio Valley" and "Electric Energy" contracts were instituted to fill the urgent and direct need at AEC installations for electric power to meet military requirements. By contrast, the Dixon-Yates combination is an attempt to meet the civilian commercial load growth requirements in the Memphis area, hundreds of miles from our nearest production installation.

Why then did I approve the signing of this contract last October? I think the record clearly states my reason. After several revisions had been made in the contract, including the addition of a 3-year recapture clause, I approved it because I believed quick disposition of this matter by the Commission was in the public interest. Therefore, I stated before your committee:

> It is my earnest hope that this action will free the Commissioners and their staff from the protracted deliberations of almost a year, which have preempted so much of their time. The execution of this contract should permit the Atomic Energy Commission once again to devote its entire energies to its primary responsibilities.

To my deep regret, this hope that I expressed last October has not been realized. The Commission and its staff are still not able to devote their entire time to their primary responsibilities. Therefore, I view with favor the resolution adopted by your committee on January 28, 1955, as the first step in a process of ridding the Commission of this drain on its time and energies. Unless the Commission is so

freed, untold hours will continue to be devoted by the Commissioners and their key staff to a matter which will not contribute one iota to our programs for improved weapons, for military and industrial reactors, or to any of the infinite number of tasks needing our attention. And, as I have so often said, anything that diverts the Commission and its staff from the development and production of weapons, along with the gigantic task of bringing into being peacetime applications of atomic energy, is not in the public interest.

Aside from the Dixon-Yates controversy, there is another issue I should like to bring to your attention. I would prefer, however, to do this initially in executive session, and I have already written Senator Anderson to that effect.

Now to turn to the future. Your committee knows better than anyone else the many and grave responsibilities of the Commission. If our joint efforts are to be successful, everything that we do in carrying them out must be complemented by the knowledge that you will sustain us in the future as you have in the past. It will be disastrous indeed if ways and means are not found to maintain the tradition of complete confidence and trust between the Commission and your committee.

I am, of course, mindful that confidence we ask can be accorded only if merited. If by reason of past actions the Commission has lost some of your confidence, now is the time to recover it. The Commission, by its attitude, policies, and indeed its every action, must dedicate itself anew to the tasks ahead. To the exclusion of all other interests it must focus its attention solely—and in the public interest—on the development and exploitation of atomic energy for defense and for peace.

None appreciate the vital role of the atom better than the members of your committee. More than any other group, you understand the potentialities of nuclear energy—both for constructive and destructive purposes. You know that these issues—involving world survival—demand the most intense, dedicated, and coordinated effort of all, Democrats and Republicans.

Surely your committee will agree that we are at the dawn of a great and wonderful era. You know of the giant strides into that era made by the superior performance of the *Nautilus*, a performance exceeding all our expectations. Does this not give us renewed courage and hope that the achievements of this new era will likewise exceed our fondest anticipations for the peaceful use of the atom? Yet time is running out. And unless we act, and act with vigor and vision that produced the *Nautilus*, we are in danger of losing the greatest opportunity ever given to man by a gracious and loving God.

Chairman ANDERSON. Are there any questions or comments? If not, we will pass on to the next section.

Mr. STRAUSS. Do you wish to take the next section?

Senator GORE. Mr. Chairman, before you leave this section, I have one or two questions for Mr. Strauss.

Mr. Strauss, as I understand your testimony, and those of your colleagues and the general manager with respect to the study groups, agreements, and clearance procedures, they all relate to the access and use of classified material, plus the use of the actual fissionable material, if given a license.

Mr. STRAUSS. I do not believe that any fissionable material is involved, Senator.

Senator GORE. Is it confined to access to classified or secret information?

Mr. STRAUSS. To confidential and secret information, restricted data.

Senator GORE. What safeguards do you have with respect to the use of such information by employees of the Commission who are employed by private industry?

Mr. STRAUSS. I don't know what you mean, sir, by employees of the Commission who are employed by private industry, since there is no duplicate employment that I know of. Perhaps I misunderstood you.

Senator GORE. Mr. Nichols said in his testimony, if I quote him correctly, "We need some agreement as to what he is going to do with the information." What agreement do you have and what is the policy of the Commission with respect to the use of confidential and secret information obtained by an employee of the Commission who later leaves the Commission and accepts employment in private industry?

Mr. STRAUSS. That is a problem, sir, that is apart and distinct from these study agreements. The Government is always faced in all of its agencies where classified information is used with the fact that when an employee is separated, he takes with him the knowledge that he had. The Government is safeguarded under those circumstances by its discretion in the selection of the employee in the first instance, and by the provisions of the law with respect to violations of the security in connection with restricted data. The law applies with equal force to the employee and the ex-employee.

Senator GORE. Not with respect to access and possession of information.

Mr. STRAUSS. I am sorry I don't follow you, sir.

Senator GORE. Your procedure here for allowing access to information is rather elaborate. Obviously a high official of the Commission already has that information.

Mr. STRAUSS. That is correct.

Senator GORE. So there would be a disparity, as you said a moment ago, between the man who has the information and a man who has not.

Mr. STRAUSS. That is right, Senator.

Senator GORE. A part of your clearance procedure, I notice, is for consultant engineers. How far would you go in permitting access to secret material by an engineer who was going to practice his profession consulting industry?

Mr. STRAUSS. It would depend on whether he was a candidate for an access agreement, a study agreement or a commercial agreement, sir.

In connection with the first, he would only require an "L" clearance. In connection with the latter two, he would require a "Q" clearance, which means that he would have a full background investigation equivalent to that given to an employee of the Commission, and that he would be subject to the same penalties as an employee of the Commission for violation of the statute.

Senator GORE. How would you distinguish between two engineers who are practicing their profession as consulting engineers, both sub-

mitting applications for access to information. How would you decide which would receive the "Q" and which would receive the "L"?

Mr. STRAUSS. I would assume, Senator, if they were both applying for the same study agreement that there would not be any necessity of making a distinction between them and you would execute a contractor agreement with both of them. One does not have to discriminate as against one in favor of another because they apply simultaneously.

Senator GORE. Would I be correct in assuming, then, that all consultant engineers who submit similar applications will be given "Q" clearance if any one of that group is given a "Q" clearance?

Mr. STRAUSS. If by definition the word "similar" means that the justification that they give for it is the same in both cases, surely there would be no distinction between them.

Senator GORE. How do you justify giving access to secret information to an engineer who expects to use it only on a consulting basis, unless he identifies his clients?

Mr. STRAUSS. I am not able to answer that positively, but I would assume that an engineer who was getting this would be under the necessity of identifying the clients, and the purpose for which it was requested.

Senator GORE. You didn't so state in your statement, nor did Dr. Libby.

Mr. STRAUSS. The statement could have been made very much longer than it was if it had gone into every detail of the proposed contract, sir.

Senator GORE. You say you assume that. Is that a fact or is it not a fact?

Mr. STRAUSS. I will ask the general manager if that is out of phase with what the plans of the Commission are in that respect.

Mr. NICHOLS. I think you started this, Senator Gore, referring to a statement I made as to what they are going to do with it. Certainly anyone in the consulting business, such as a consulting engineering firm, or anybody else—whether it is doing fabricating work or that type of effort in the atomic-energy field—can't do it for anyone that would require the transmittal of classified information to them unless that particular outfit that is receiving it is also cleared. That is what I meant by what is he going to do with it. Anyone that gets information must agree that he will obey or comply with the law. In other words, transmit classified restricted data only to people who are cleared for classified restricted data. That was the basis of my statement of what is he going to do with it, as I recall it.

Senator GORE. Then before a consultant engineer can have access to this information, he must come to the Commission with the employment of himself by some concern who is to use this information for its advantage?

Mr. NICHOLS. I don't believe that is in here.

Senator GORE. Would not that follow your statement?

Mr. NICHOLS. No. I stated if he gets the information he cannot transmit it to anyone, regardless of whether or not they are cleared. For example, we have groups now that have made studies of various reactors. They are dealing with various utility study groups. If they deal with a utility that is not cleared, they can only pass on unclassi-

fied information. Whereas if the particular reactor study group is studying how to develop a particular type of reactor and may have detailed designs on it, talk to a group of utilities that are cleared, they can transmit their reasons for various conclusions. So you must have some rules here as to what happens to the information when any of these groups that we call here commercial agreements, some idea what enterprise they are going into.

I believe that was a statement made to check later to see if they are using it or acquiring it for sheer curiosity.

Senator GORE. Then you have no standards yet as to how you will differentiate between the applications from consultant engineers?

Mr. NICHOLS. The thought here was that anybody legitimately in the business requiring a commercial license or agreement would be able to get it. The idea was to have no discrimination. But you did not want someone that is not going to use it or just acquire the information for his own edification.

Senator GORE. Mr. Strauss, do you agree with that?

Mr. STRAUSS. I would like to say this, Senator. The Congress in its wisdom provided that licenses should be granted and the Commission should engage in licensing.

Senator GORE. We are not talking about licensing. We are talking about clearance for access to secret information.

Mr. STRAUSS. Would you mind repeating your question, sir?

Senator GORE. I inquired if you agreed with the statement that Mr. Nichols has just made.

Mr. STRAUSS. I do; yes. I would also point out that this is a new territory in which the Commission has embarked, and it is entirely possible that as experience is gained, we may be modifying it. We certainly don't make any representation that this is an ideal and infallible situation. It is the best we can devise at the moment. We have to get off center. We have to start something.

Senator GORE. Do I correctly understand, then, that it is the policy of the Commission to make available to all practicing consultant engineers a clearance for classified information?

Mr. STRAUSS. In principle, yes, but only where just cause can be shown for it, since otherwise we would not be able to get to our work. There are more consulting engineers in the country than people employed in the Commission.

Senator GORE. Then we are right back where we started. What is that just cause? Mr. Nichols just said that he assumed that all consultant engineers in the commercial field would be entitled to the information. I believe I stated him correctly. You said you agreed with it.

Mr. STRAUSS. They are entitled to it if they can show cause for it. There is no purpose at all in entering into a study agreement with a man because he is an engineer who will never have any use for the information. It would be a waste of Government——

Senator GORE. Is the Commission going to be the judge of that?

Mr. STRAUSS. You have set us up.

Senator GORE. Suppose that consultant engineer wants it for his information because he has a prospective client and he thinks he can put it to profitable use.

Mr. STRAUSS. If he is able to convince the Commission staff who will hear him, I think under the circumstances he is entitled to a study agreement.

Senator GORE. Isn't that going to give wide dissemination to secret information?

Mr. STRAUSS. To secret information, no. Under the circumstances, he will not be engaged in a commercial agreement. He will be engaged in an access agreement, and that is not secret information. That is confidential.

Senator GORE. To confidential, then.

Mr. STRAUSS. Yes; there will be a wide dissemination of confidential information and I had assumed from the language of the statute you had envisaged that when you passed it. I am in favor of it.

Senator GORE. They why would you continue to call it confidential?

Mr. STRAUSS. Because until it is handed to the individual it is in confidence, and it is in confidence after he gets it. He is unable to dispose of it other than under the restrictions which govern the dissemination of restricted data. Otherwise, we would declassify in standard.

Senator GORE. You don't think that an engineer who has been in the employment of the Commission thereby entitling him to secret information will have a great competitive advantage over other consultant engineers?

Mr. STRAUSS. I think he does, sir. I do not know of any case where it has been abused. I don't know of any way you can engage in brain washing after a man has left the Commission.

Senator PASTORE. It would apply to the members of this committee, too.

Mr. STRAUSS. And those who are no longer members of it.

Senator GORE. I was not addressing my questions in the context of brain washing.

Mr. STRAUSS. I was being facetious, and I apologize. I meant simply to say that I do not see how one can avoid the fact that a man who has worked for the Government or a business carries away with him when he leaves that employment, Government or business, knowledge that he had gained in the course of his employment. It is inevitable.

Senator GORE. I wish you to know that I do not mind you being facetious.

Mr. STRAUSS. I apologized.

Senator GORE. No apology is necessary. I understand that. When did you first learn of the intended resignation of Mr. Nichols?

Mr. STRAUSS. I first discussed the subject when General Nichols came to me and told me of his dissatisfaction with his income status. It may have been in the early fall or late summer, or even the late spring of the past year.

Mr. NICHOLS. September, to be exact.

Mr. STRAUSS. I would say, though, that General Nichols has been a personal friend of mine for many years, and this conversation was on a personal man-to-man basis.

Senator GORE. I yield.

Senator HICKENLOOPER. I merely suggest that it is possible that this inquiry might be going into the realm of purely personal affairs, without canvassing it in executive session—and I have no desire to object to the Senator's inquiring at this particular time, I know nothing about

the circumstances; I have never discussed the matter with General Nichols or the Chairman or anyone else along that line, so I do not know—but if it is a matter of purely personal affairs, I would suggest that it first be canvassed, if it is necessary to canvass it, in executive session.

Senator GORE. I assure the Senator I have no interest whatsoever in purely personal affairs between the two gentlemen or any other gentleman. Will you proceed with your answer.

Senator HICKENLOOPER. I do not mean it is personal between anybody here. General Nichols may have some very important personal reasons for his decision.

Senator GORE. Mr. Chairman, I view as an increasing national problem the constant raiding of the Atomic Energy Commission staff by the private interests of this country who offer them far greater compensation than the Government affords. I am not accusing anyone of wrongdoing in making that statement. It is a public question that I think deserves and requires examination. I am submitting to Admiral Strauss a few questions indicating his attitude about this problem which I think we all recognize is a problem. My statement does not imply any wrongdoing on the part of anyone else who has left the Commission. Obviously people are entitled to earn a living. But I think the Commission ought to be giving some consideration to that problem, if it has not. If it has, I would like the benefit of the Commission.

Senator HICKENLOOPER. If the Senator will yield, I do not in the slightest indicate that the Senator does not have the right to explore that particular field. I have the least knowledge of the situation, and I do not know what the answers would be—I would not even speculate on them—I was only suggesting there might be some private reasons.

Senator GORE. I had not intended to ask the reasons.

Senator Hickenlooper. I do not know. I have no objection to the Senator asking any questions he wants to in executive session first, because I do not want to attempt to object to his going into this.

Senator GORE. May I proceed, Mr. Chairman?

Chairman ANDERSON. I would think so. I do not know. It seems to me that we have some laws with reference to the fact that a man who is a lawyer for a department cannot leave the Government and turn right around and file suits and operate in the field that he left. Apparently that does not apply to an engineer.

Mr. STRAUSS. I do not know.

Chairman ANDERSON. He can work for the Government and turn right around and put himself in a position to make many times what he is now making. If General Nichols can do it, everybody can do it. The entire AEC is open for immediate raid, because everybody in the business would like to pick off a top AEC engineer man and leave the country without his service. At least you feel that when a man comes to work, he would intend to stay a few months.

Mr. GORE. That points up the problem I have in mind. We have gone through all the discussion about how certain concerns are going to be allowed access to information and how their employees or their consultant engineers will be allowed access to certain information. Yet with no laws to the contrary, the whole technical staff of the Atomic Energy Commission is apt to be sought by special interests

who want people in their employ who already have the information which others may be denied.

Mr. STRAUSS. In most cases, Senator, I think they are taken for their general excellence, and not for their specific knowledge of atomic energy matters.

Chairman ANDERSON. You just stated that if somebody came in to get information, you would ask that person the purpose for which he used the information. But if he comes in to hire a man, he does not have to reveal it. That man just proceeds to tell him everything he wants to know, and he can use it for everything he wants to.

Mr. STRAUSS. If he tells him everything he wants to know, he has violated the law.

Chairman ANDERSON. Not once he is in their employ and in their work.

Senator GORE. He might very well give advice based on the most secret information.

Mr. STRAUSS. He might. I don't know how you can get an employee in any Government position if a condition of employment was that he would never take private employment. This problem, sir, has bothered me certainly as much as anyone else.

Senator GORE. Let us come to it. I would like to know if the Commission has some policy on it. You say you have given consideration that it has bothered you, and I am sure it must have, and I am sure it must have bothered the other Commissioners.

Mr. STRAUSS. It has bothered me.

Senator GORE. I am not being antagonistic about this. I think it is a real problem that is threatening the whole integrity of your security system, and the whole opportunity for fairness in the peacetime development of atomic energy.

I asked you when you first knew of General Nichols' intended resignation.

Mr. STRAUSS. May I come to that, and say this, that the phenomena to which you have referred, namely, the leaving of the Commission for private employment is not a new phenomena. There have been general managers——

Chairman ANDERSON. You are being a little sarcastic.

Mr. STRAUSS. I am sorry, sir. This dates from the earliest days of the Commission.

Chairman ANDERSON. It is not a phenomena as we all know. But it is a little different when you are dealing with restricted information.

Mr. STRAUSS. I am sorry, these gentlemen all had restricted data from the very first day. Mr. Wilson, the General Manager, resigned; Mr. Shugg, the Acting General Manager, resigned; Mr. Boyer, the General Manager, resigned. There have been four general counsels who have resigned. There have been 2 directors of the Division of Research, 2 comptrollers, and so on. This is not a complete list, but I am anticipating that the question might arise, and I had it made up.

Senator HICKENLOOPER. Mr. Chairman, as long as we are opening the subject, I might suggest it is not limited to employees of the Commission. A number of Commissioners have resigned and have enhanced their incomes because of their experience on the Atomic Energy Commission. So let us get them all on the table and discuss them all.

Senator GORE. I agree with the Senator entirely. I am trying to open up the problem. Unless someone can offer some contrary suggestion, I intend to offer a bill to prohibit members of the Commission staff from the use of information or the practice of a profession in the use—I would not prohibit the practice of a profession—but the use of information in the practice of their profession within a 3-year period.

Now, if we may proceed.

Mr. STRAUSS. I would like to answer the question you put to me.

Senator GORE. All right.

Mr. STRAUSS. General Nichols refreshes my memory. He says he first discussed this with me in September of 1954.

Senator GORE. When did you first acquaint the Joint Committee of that fact?

Mr. STRAUSS. I first acquainted the Joint Committee of it by letter written, I believe, on Friday, and delivered today to the chairman. In the meanwhile the subject had become public through circumstances which neither I nor the General Nichols are familiar with. We had both felt it was resirable that it not be announced until his successor had been selected. For purposes of morale it seemed a good thing to do. That purpose was defeated by the leak of the information.

Senator GORE. I can agree with you with respect to the announcement. I would like to know why you delayed until Friday imparting that information to this committee.

Mr. STRAUSS. The decision on the part of General Nichols became final, as indicated to me in a letter dated the 17th, I think it was, and therefore there was a difference in time, eliminating Saturdays and Sundays, of something like a week.

Senator GORE. How far did this conversation in September go? Was it a possibility or did he indicate it was his intent to resign?

Mr. STRAUSS. Never thinking that I would be asked a question, sir, I made no memorandum of it. It was a friendly conversation at dinner or breakfast or one of the other occasions when we get together, and he told me about it. I never dreamed that I would ever be asked to recollect its terms.

Senator GORE. It is not my desire to pry into a personal conversation, but I doubt if we could classify that as personal. Under the law this committee has responsibiilties and duties. Under the law the Commissioners have a responsibility and a duty to keep this committee informed. I doubt if you can classify as personal and thereby avoid imparting information to this committee a conversation relating to the employment or resignation of the General Manager of the Commission.

Mr. STRAUSS. I would have to differ with you there, Senator, perhaps incorrectly. When a friend discusses his personal plans with me on a personal basis, I would have to regard it as personal.

Senator GORE. Mr. Commissioner, I share with you respect for personal confidence. But when personal confidence comes face to face with legal obligation, then personal confidence must take a secondary position.

Mr. STRAUSS. I didn't feel I was violating any legal obligation.

Senator PASTORE. Will the Senator yield?

Senator GORE. Yes.

Senator PASTORE. Admiral, in the conversation that you mentioned that took place between you and General Nichols last September, did the General say he was going to quit or did he give indications he was thinking of it?

Mr. STRAUSS. He gave indications, I attempted to dissuade him. I thought for a time I had. In fact, I was fairly confident I had.

Senator PASTORE. There was nothing definite?

Mr. STRAUSS. We discussed it on subsequent occasions and the idea firmed up in his mind. When we get to the executive session, I may be able to give you my background of some of the reasons.

Senator GORE. When did the idea firm up?

Mr. STRAUSS. I have no statement on that.

Mr. NICHOLS. I considered when I signed the letter it firmed up. Up to that time it was something I was considering and could change at a moment's notice. Of course, I have considered for many, many years I might leave the Government. I never felt that when I started some 30 years ago on the Government payroll that signed me to live forever with the Government. I considered at various times. My first time I considered it was when I was a first lieutenant. I have done it subsequently at various times since then. I indicated to Mr. Strauss in September that I doubted if I would stay on 8 or 9 years, as he had often spoken to me as the proper thing for me to do as a General Manager. In other words, make a complete career of a Government service right from beginning to end. That would add up to a total of 40 some years, and maybe more than that. I decided gradually as time went on, no, I would shift over to some other type of enterprise.

In September I indicated to Mr. Strauss that I was thinking along those lines. He said, "I hope you won't make it too soon." I said, "I have no immediate plans. I will give you at least 3 months warning when I finally make up my mind."

I consider I have done that in a letter dated January 17, effective May 1.

Mr. STRAUSS. Senator, may I offer just one observation.

Chairman ANDERSON. May I ask one question? The fact that we were in the midst of the Dixon-Yates controversy, did that have anything to do with your decision to hold in September?

Mr. NICHOLS. No.

Chairman ANDERSON. You did not agree to see that through?

Mr. NICHOLS. No, sir, I did not agree to see that through.

Mr. STRAUSS. I just wanted to offer one observation, sir. I am thinking now of 2 or 3 valuable men who have left the Commission for private life, and are receiving salaries of multiples of their Government salaries. When I say multiples, I mean several times. One man is in the mining business—iron mining—it has no bearing on atomic energy at all. Another one has gone into an investment business, but not having anything to do with atomic-energy stocks. I know of another man who has gone into the automotive field but with no possibility that I can see of anything having to do with atomic energy. He will be getting 8 to 9 times what the Government paid.

I do not know how the Government can hold these exceptional people under those circumstances. I think we should consider that during the period when they have worked with the Government at the proper

pay scales that the Government pays, that the taxpayers have gotten a bargain for that length of time.

Senator GORE. I would like to submit one further question, and then I would like to have the benefit of thinking on this general problem.

When did you first acquaint your fellow Commissioners of General Nichols' intended or prospective resignation?

Mr. STRAUSS. General Nichols set a time limit.

Mr. NICHOLS. May I answer that?

Senator GORE. I would like Admiral Strauss to do it.

Mr. NICHOLS. I delivered a copy to each of them.

Senator GORE. Would you reply to the question?

Mr. STRAUSS. When it became firm, and when General Nichols' decision was irrevocable, namely, when he wrote his letter, I intended to send the letter about and I saw on the bottom of the letter that copies had gone to the Commissioners.

Senator GORE. You do not think that a matter so important as the prospective resignation of the General Manager of the Commission is of sufficient importance to justify your confidence in your fellow Commissioners?

Mr. STRAUSS. Not so long as I had it on a personal basis.

Chairman ANDERSON. Could I ask, does that extend to the members of the Joint Committee at all? Do you suppose it is a very pleasant thing to have a newspaperman call you and say, "I just got a statement from General Nichols that he is leaving the Commission on May 1. When did you first hear about it?" I said, "I am just now hearing it."

Mr. STRAUSS. That is very unfortunate. I am sorry.

Mr. NICHOLS. May I make a statement on that?

Chairman ANDERSON. If you can make me feel a little better, I will be happy.

Mr. NICHOLS. I can make you a little happier. I knew Mr. Strauss was writing a letter to the Joint Congressional Committee. I knew his secretary told my secretary that she would send a copy down as soon as it was firm. Saturday morning I called to see if I could get a copy and she was out, so I did not know whether it had been sent or not. Friday this thing started to leak. The calls started to come in my office, and my home, at the rate of about 15 minutes apart. I had to be unavailable for a long time. However, on Saturday about 1 o'clock my wife called and said, "There is a big article in the New York Times," and she read it to me. By that time I had received it from several other places.

I called Mr. Strauss at his home, or where he was, and told him I was seriously considering releasing my letter of resignation. He said he hoped I would not do so. I said, "I feel that is my decision if I want to make it." So by 2 o'clock Saturday afternoon, I decided I would release my letter.

My apologies to you, Senator Anderson, because I thought you were going to be informed. I felt here was a case that the only thing the office could reply and the only thing anybody else could reply was "No comment." I was not going to deny I resigned when I signed a letter. So I could not talk to anybody. I felt this has reached the point where it is in many newspapers. The only thing to do is to

admit it. I felt the sure way to admit it best was to release the letter, which I did.

I talked to one reporter who called me. He was one of the ones—I don't know whether he has the half hour on the hour or every hour, but he continued through, and I finally released it to one of them, and finally went down to the office before I went to a dinner party on Saturday night and got out a copy of the letter, and had our public relations man come down and make it available to the press generally.

What I wanted was to indicate that my motives were purely personal, and to end the question period. In other words, reporters were trying to seek me. I still feel it would have been much better for everybody concerned if the Joint Congressional Committee could have been informed properly, where a replacement could have been selected, and announcement of my successor, and the fact I was leaving, made some time about April 1, or some time in March. It would have been much better all around. But the thing leaked. Once it leaked, it spread. I didn't realize I had so much public relations or publicity value. I never did before.

My apologies to you, sir, for tying up the procedure of getting you properly informed.

Senator GORE. Mr. Chairman, I want the record to plainly show that I take exception to any policy which permits the personal friendship between the Chairman of the Commission and the General Manager, which condition I shall hope will always exist, to be sufficient justification for the Chairman of the Commission withholding official important information from either this committee or his fellow Commissioners. With that statement I would like to inquire both of Mr. Strauss and also of his colleagues what policy you have, what possibility is there to assure that you will not again have an engineer come in as General Manager for 12 or 15 months, only to leave for employment many times his salary because he has secured this information.

Mr. STRAUSS. That is not the reason the general is leaving. The fact that he has secured information, I am satisfied, will repudiate his having anything to do with his leaving.

Senator GORE. I did not refer to the general. What assurance does the Commission have, or can this committee have that you will not for the next year and a half have as General Manager someone who at that time will leave at a greatly enhanced salary from private interests.

Mr. STRAUSS. I don't know, Senator. We can enter into no contracts that would be reciprocal in any way with the Government employee. At least I don't believe we can.

Senator GORE. You stated that this problem had bothered you and you had given a great deal of concern to it.

Mr. STRAUSS. Yes.

Senator GORE. I will have no further questions. I would like to have the benefit of your thought, and that of your fellow Commissioners on this problem which I regard as a real one.

Mr. STRAUSS. How would you care to have us? Shall we speak in order? Dr. Libby.

Senator GORE. You are first.

Mr. STRAUSS. I think my attitude has been very plainly demonstrated by the fact that I undertook to dissuade General Nichols from resigning. I persuaded him to undertake the assignment in the first

instance. I think when we come to an executive session some of the reasons that I think may have weighed with the general can be discussed.

In any event, I certainly would want to see a man serving in that capacity—satisfactorily serving in that capacity—make it a career. That was my hope, and my belief at this particular time.

On the other hand, I don't think that 5 Commissioners or any number of Commissioners less than 5 can assure you, sir, that when we engage a General Manager or any other officer of the Commission that we can insure his tenure.

Chairman ANDERSON. Do you have any feeling on this law that says that a man who is practicing law—you cannot get an extremely competent lawyer downtown to take a case in committee counsel because it bars him for 2 years—what would you think of a provision that kept a man who acquired knowledge of arts and plans and secrets for not having anything to do with Government or the Atomic Energy for 2 or 3 or 4 years?

Mr. STRAUSS. I would be in favor of it. I think in case where the natural delicacy would not restrain an individual from using his information——

Senator GORE. Are you endorsing the Gore bill?

Mr. STRAUSS. I don't know it, sir. It seems to me where the proprieties did not make themselves sufficiently apparent to the individual, the law might supply the deficiency.

Chairman ANDERSON. You understand we all recognize that this has happened many times. The departure of Dr. Hafstad, who is certainly one of the able people we needed in this program, the departure of General Nichols, and the departure of several other people, and that offers that have been made to the individuals—one particularly that I know that I do not see how he withstood—we need him for the defense of this country tremendously.

Mr. STRAUSS. I would like to say with respect to Dr. Hafstad that he remained for a year and a half after he had large offers at a salary which he could very easily better. Since he has left the Commission, I have seen no indication whatever of his use of any contacts. He has not been near the Commission that I know of.

Chairman ANDERSON. Do you think the Chase National Bank hired him for a banker?

Mr. STRAUSS. I think they hired him for his general scientific competence. There are many people in the banking business who are not bankers, Senator.

Chairman ANDERSON. You know, I do not.

Mr. STRAUSS. I got in that way myself.

Senator GORE. Mr. Chairman, I had asked the other Commissioners to respond to that, if it is all right.

Mr. MURRAY. I would hate, Senator, for your amendment at the moment to be adopted or your proposed amendment. I think you should give the Commission a little more chance to think this thing through. If you put the members—this is just an offhand opinion I have—in the position that people that come into the employ of the Atomic Energy Commission with that restriction, you may be doing harm to a program that would require many years to overcome.

As I say, we have to go out and solicit, and must bring new men into our program. I don't know where you would go to get men

for the General Manager's caliber unless you go to industry. I really feel that I would like to have you give a little more thought—I know you will—and give me an opportunity to think through it.

At the moment I think that would be very unfortunate to have such a provision. I think it would impose on us burdens that are very heavy in order to get people to work for us. I think it is interwoven in your mind the security procedures and the people getting access to information being in a position to go out into industry and use that information. I realize that it is unfortunate. I hope that such a plea that you are now making to industry that they don't raid might have some effect. I hope industry will step up to problems like they did when they allowed us to engage Marion Boyer in our organization. They will continue to think in those terms.

Senator GORE. Mr. Commissioner, I respect your opinion. I assure you I will give careful thought to it even before introduction. I certainly would want to discuss it with the whole Commission. Do you not realize that with all of this procedure for permission for clearance to classified information, it might be much easier for an enginer just to get a job with the Commision in the first place, and he would have access to the topmost secret information if he was high enough in the organization for a few months, and then he would be footloose and fancy free, and at a competitive advantage over all these people who have gone through the slow process of getting a "Q" or "L" clearance.

Mr. MURRAY. I realize the danger. I also realize the great possibilities and dividends that are here for us in the future to get on with the job. How much time we have to get on with the job is another problem. As I say, I would just like to have you think it over. There might be some answer to it. At the moment that is the way I feel about it.

Dr. LIBBY. It certainly is a very serious problem you raise, Senator. Our most desperate need in getting on with the technical phases of this program, and these, I believe, are the most critical ones, is to guarantee the employment of technically competent people, particularly in the higher places where their decisions and judgments are so vital.

I know of no way by which you can guarantee that a person will stay. I don't understand how one could do this. It seems to me that most of these offices could be held for a certain period of time as a minimum. I think most people try to do that. The difficulties are so great, however, that I don't see any way of assuring that when you hire a senior officer he will not leave you.

As the chairman said, you can persuade and try to impress upon the officer the importance of continued tenure for a certain time. The length of term is also a serious question. I am by no means certain that it would be good to have these high officers stay in office for many years, that is, 10 years or 15 years. I am not certain this is so. I do believe there is a certain minimum period of time. What that minimum is, I would find difficult to specify, but I would say 3 years, or something of this sort, as a minimum would be a proper time.

But I certainly can understand the difficulties of people who are in these positions. I don't believe we can ever have an arrangement where we are guaranteed employment for any statutory period.

Chairman ANDERSON. Dr. Libby, there is a man connected with the Los Alamos Laboratory who is a university professor. He has some peculiar theories what he can do if given a chance to develop atomic energy from nuclear processes. He has been offered $50,000 a year to start. About how long would he have to teach to get to that scale? Mr. Van Zandt.

Representative VAN ZANDT. I think over a period of several years the committee has fully explored this field. I think when Mr. Wilson left, we spent many days on it. When we wrote the Atomic Energy Act of 1954, we spent several days on it. The answer was, of course, money. Could we meet the competition of private enterprise. We agreed we could not.

Mr. NICHOLS. Could I make a statement on this? I seem to be the one that set this off, Mr. Chairman.

Chairman ANDERSON. No; Mr. Boyer left this Commission.

Representative HOLIFIELD. Would you let me make a statement, sir?

Mr. NICHOLS. Surely.

Representative HOLIFIELD. Mr. Chairman, I would like to say I would like to aline myself with the statement Mr. Murray made. I do not want to be in controversy with my friend and colleague on the committee, but this has been a longstanding matter before this committee, as Mr. Van Zandt said. We have considered these things before. I think that at this late date the thing has concerned this committee and is the thing which I predicted would happen, and others predicted would happen when we passed the Atomic Energy Act of 1954, that it would destroy the Government's program and it would transfer the key personnel in the Government program at higher salaries to private industry, because they could afford to pay with tax moneys salaries which the Government could not pay.

This is happening and is going to continue to happen. I think it is going to happen as a result of the bill. I am not saying necessarily that the bill was bad or good. I am saying that we foresaw that would happen, because naturally industry would want to get these qualified men.

I want also to say that the statement made by you, Mr. Chairman, that every one of these men have rendered a service to the Government far in excess of what the Government has been able to pay them is a correct statement for the period of time they have been in the Government service. I think that General Nichols has rendered a great service. I am sorry that he is leaving the Commission, as I was sorry to see Mr. Wilson and Mr. Dean and the young man that was the chief of staff of our committee, Bill Borden, and others, Dr. Hafstad, Dr. Beckerley, and Dr. Bacher and others. I do not think we can handle this. I think it is far too late for us to try to handle it by legislation. I think it would destroy what is left of the Commission if we do try to put restrictions on getting good men to come in for a short period of time. That is my sincere feeling, and I want the record to show it.

Representative COLE. Mr. Chairman, I would like to supplement the remarks of Mr. Holifield. This has been a subject that has disturbed the committee for many years. We have recognized that it is here. But how are you going to solve it? I doubt if a flat prohibition or requirement that the men must work for 2 years will accomplish it, for the reasons pointed out very properly by Mr. Murray.

While it is an important subject, I would hate very much to have it interpreted that this discussion indicates any criticism or cloud of impropriety on the part of what General Nichols has done in taking the step which he has taken. I think it would be unfortunate that this would be used as a stigma upon his very, very fine record. I feel quite sure it is not intended as such by the Senator from Tennessee. I certainly hope the folks who will interpret it for the public will not give an improper interpretation on it.

General Nichols was asked to come to the Commission to take this position. He served in the position creditably. I do not know whether he went out and sought the job which he has, but I assume the job sought him, because of his superior talents. I do not think that he did anything wrong, improper, illegal, immoral, or dishonest. I can only express regret that the temptation of the inducement that was offered to him was so great that he just could not refuse it.

Representative DURHAM. Mr. Chairman, I think Dr. Libby is probably in a better position to answer this question, being a teacher. He knows how difficult it is to get some categories of scientists. It happens that in some professions it is an entirely different matter. I have been concerned about this for a good many years. I was opposed to putting restrictions on lawyers or anybody else in the practice of their profession. I don't care who it is. The law of the land in my opinion is certainly able to take care of matters like this. When you get into that, you get into a restricted process, that is, restricted information which we are trying to get out into the hands of the public so we can do something with it for humanity.

Here we find ourselves all tied up in a mess of agreements which I don't know heads or tails about as to whether we will get it out or get it in.

There is one other thing I want to ask. We laid out the rules under this international agreement, more or less. In other words, we defined the areas on the basis of what in formation you could give to these agreements when you set them up on an international basis. In our domestic agreements we did not defiine what you could do. We left it in a more or less gray area to do almost completely what you want to. The final determination in my opinion as to whether or not this country makes up its mind it is going to do anything with atomic energy for humanity and industrial purposes is going to be in the hands of the Commission and their judgment in making these agreements.

You are going to have to accept the responsibility. It is not defined in this act. In the so-called gray area you can either stop it or put it out in the hands of the people who will do something with it.

Here I think you have a much better guide under the international agreement to follow. Do you agree with me or not?

Mr. STRAUSS. Are you addressing me?

Representative DURHAM. I am addressing you as Chairman.

Mr. STRAUSS. I think it is more specific in the area of international agreements because there obviously we lose control of information once it passes out of our hands to foreigners, whereas in dealing with our own people, we have certain controls.

Representative DURHAM. A man who goes out to build a reactor in some other country under one of these agreements will have a far

better chance of developing free of restriction than he does in our own country if we do not watch ourselves.

Mr. NICHOLS. I wanted to make one comment on this general discussion. One is that no industry approached me with a startling offer that induced me to leave the Government service. In other words, I have not had many offers, but people talked to me many times. At the time I made up my mind I was going to leave, I then approached a few of my friends and announced it to them confidentially, and said I would like to talk to some people. I don't have any startling offer. As I commented, on this $100,000 offer, I would like to know who is making it. I haven't heard it.

Chairman ANDERSON. I can give you a little information on that. I had a man leaving the Department of Agriculture who was going back to his old $24,000 a year job. I insisted that he go to the hotel and hide out for 3 days. I made good use of the grapevine system, and they said what sort of offer does he have? I said I know of one $50,000 offer. In a short time somebody made him a $60,000 offer. Put it in the hands of your friends.

Mr. NICHOLS. In other words, at the present time I am unemployed except for the remaining time with the Commission.

Chairman ANDERSON. You said you discussed this first with the chairman some time back in September.

Mr. NICHOLS. September, I believe.

Chairman ANDERSON. When was Mr. Cook made assistant general manager?

Mr. NICHOLS. About October, I believe. I am not sure of the exact date but I believe it was October.

Mr. STRAUSS. That had been discussed for a considerable time prior to that.

Mr. NICHOLAS. In regard to that, I held up making a deputy until such time as I had a chance to look over the field.

Chairman ANDERSON. We are to start at 2 o'clock tomorrow, and we will try to stay right on the subject.

(At 4:45 p. m., Monday, January 31, 1955, a recess was taken until Tuesday, February 1, 1955, at 2 p. m.)

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

TUESDAY, FEBRUARY 1, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met at 2 p. m., pursuant to adjournment, in room P–63, the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson (chairman), Pastore, Gore, Jackson, Hickenlooper; and Representatives Durham, Holifield, Price, Cole.

Chairman ANDERSON. The Joint Committee will be in order. Will you proceed, Mr. Chairman?

STATEMENTS OF LEWIS L. STRAUSS, CHAIRMAN OF THE UNITED STATES ATOMIC ENERGY COMMISSION; THOMAS E. MURRAY, MEMBER; DR. WILLARD F. LIBBY, MEMBER; KENNETH D. NICHOLS, GENERAL MANAGER; WILLIAM MITCHELL, GENERAL COUNSEL; AND MORSE SALISBURY, DIRECTOR OF INFORMATION SERVICES, ATOMIC ENERGY COMMISSION

Representative COLE. Before we go into the Commission's testimony, I would like an opportunity to clarify with Mr. Murray the basis for his apparent change in attitude toward the utility contract known as the Dixon-Yates, when he made the statement yesterday which he did, culminating in his concurrence in the action of the Joint Committee last week in undertaking to rescind the action which the committee had taken in November granting a waiver of the 30-day clause.

At that time, it was my impression or my recolletion that Mr. Murray had not only given his unqualified endorsement and approval to the contract as it had then been revised, but had also joined in the request to the committee to grant a waiver. So for him to come in yesterday afternoon and say that now he is of a different viewpoint caused me considerable surprise.

Since that time I have had occasion to refer to the record and I find my recollection is correct, and that he had endorsed not only the contract but the request for waiver.

I should like now, since Mr. Murray has himself raised the question, to inquire the basis for his change of attitude.

Mr. MURRAY. Mr. Cole, I never endorsed the contract as a contract. I stated, as it is my recollection, that I believed it was in the public

interest that we should get on with the business and that this contract should be signed.

Represenative COLE. Let me quote exactly what the record shows, and perhaps the record is wrong.

Mr. MURRAY. I would like to have my memory refreshed.

Representative COLE. Perhaps the testimony is incorrect on the part I refer to, on page 613, where Mr. Van Zandt asked Mr. Murray:

> Are you entirely satisfied now with the contract?
> Mr. MURRAY. I am entirely satisfied that the contract should be signed, and I believe it is in the public interest to sign it.

Mr. MURRAY. That is exactly what I am saying today; exactly.

Representative COLE. Well, it is difficult for me to understand a position which says that you should do something which in your own heart you have a reservation about doing.

Mr. MURRAY. I am taking exactly the same stand today, that it is in the public interest that we get rid of this contract.

Representative COLE. Was it not your position last November that the committee should grant the waiver?

Mr. MURRAY. It was not. I did not as I recall, I never joined in the application that a waiver should be granted. Is there any testimony to that effect? I can't recall any.

Representative COLE. I asked you the question and I admit your answer was equivocating; I will withdraw that. Your answer did not specifically respond to the question:

> Chairman COLE. That was the question I was about to raise, to solicit your recommendation with respect to whether a waiver should be granted or not. I was about to interpret what I thought your position on it to be. Perhaps you would be in a better position to state it yourself.

To that you responded:

> There is no question in my mind, as I have stated before, that we should never have been drawn into this particular controversy. It is a controversy that is here, and it has to be resolved. I will just be repeating what I have said before, that we have many important things to do and the sooner this particular contract can be resolved, as far as I am concerned, it is in the interest of the public to have it resolved.

You do not construe that as tantamount to supporting the request for waiver, do you?

Mr. MURRAY. Not at all.

Representative COLE. Even though a waiver in itself would accelerate a resolution of the difficulty?

Chairman ANDERSON. I think the record will show it did not solve the difficulty.

Mr. MURRAY. That is why I took the position I did, Mr. Cole. I think my statement, if you read it as of yesterday, makes my position as clear at least as I can make it. I believe that, just repeating what I said yesterday, it is about time that the Atomic Energy Commission is relieved of the difficulties that we are being drawn into in the Dixon-Yates controversy.

Representative COLE. That raises another aspect of my question. What has developed with respect to the Commission's activities, in the Commission's activities with respect to Dixon-Yates since last November? On yesterday you said it was still bedeviling the Commission, in substance.

Mr. MURRAY. Well, isn't it?

Representative COLE. What has happened in the Commission since then? Has this matter been discussed by the Commission and reviewed and reconsidered, and has it interfered with the Commission's work?

Mr. MURRAY. It surely has. I can document it to you, but I think it is so evident. Why are we here today? And why aren't we——

Representative COLE. You are certainly not here today because of the Dixon-Yates controversy.

I would like to have you tell me when and the subject matter and the phase of the Dixon-Yates the Commission considered in this since last November?

Mr. MURRAY. Well, in answer to a statement that I made at the last hearing, I referred to the fact that I thought it was interfering with weapons production, and other activities of the Commission, and statistical information was brought before this committee telling us how many meetings the Commission had held during the last year, and how many times at the Commission meetings the particular Dixon-Yates matter was raised. It was an attempt to evaluate the amount of time and the attention and thought that was given to a matter of this kind by some statistical methods. You are not able to get at a job of this kind in any such fashion.

Representative COLE. It is conceivable that this problem which admittedly is a difficult one, the Dixon-Yates, may have troubled you.

Mr. MURRAY. It surely has.

Representative COLE. Understandably so. But for you to say that because it has disturbed you, and taken a good bit of your time and mental energy, for you to say that it has invaded the operation of the Commission, unless it can be substantiated, and unless the facts substantiate it, I think it is a rather broad statement.

Now I should like to give you the opportunity, and of course you are not prepared to do it today, of submitting to me or to the committee—of course, to the committee for the record—the times since November 12 or whatever that date was that the contract was approved or waiver granted by the committee, whether the Commission has considered this subject.

Mr. MURRAY. Do I understand you to want more statistical information of the number of times the subject was brought before the Commission, and the number of actions that were taken on it since the last time?

Representative COLE. Whatever you are able to furnish which will support your statement that since granting of the waiver by the committee last fall, the Dixon-Yates contract has impaired the operations of the Commission and has been considered by the Commission.

Mr. MURRAY. It has interfered with my activities and I think as you get other witnesses before you, Mr. Cole, you might ask those persons those same questions.

Representative COLE. If they make the same charge, I hope that I will ask them the same question. Would you provide those?

Mr. MURRAY. Yes, I will.

Chairman ANDERSON. Then I think the chairman will be ready to testify whether he has heard of it in the interim from November to the present date?

Mr. STRAUSS. I beg your pardon.

Chairman ANDERSON. You have been busy with it. At least you have talked to me.

Mr. STRAUSS. I have been busy. I think that since the Commission approved the contract, and reported it to the Joint Committee with the request for a waiver that there have been reports by the General Manager to the Commission of progress in negotiations, but I can recall no discussions in the Commission. I won't go so far as to say that they have not occurred. I cannot recall any discussions.

Chairman ANDERSON. Did you, yourself, issue a fairly long statement on it?

Mr. STRAUSS. I had a press conference on the subject.

Chairman ANDERSON. That is right. Was it the only one?

Mr. STRAUSS. Only one press conference on the subject, after November 12.

Chairman ANDERSON. Did you not release a rather long statement on the Dixon-Yates contract?

Mr. STRAUSS. At the press conference.

Chairman ANDERSON. Did that take any time?

Mr. STRAUSS. It certainly took the ordinary time to prepare.

Chairman ANDERSON. I think Mr. Cole's statement or request is perfectly proper, and I hope that Commissioner Murray will accede to it and I do feel it is going to open up a subject for rather long discussion, but we will have time for that.

Representative HOLIFIELD. Could I ask one question on that?

I would like to also know if the legal staff of the Commission have been involved in discussions and have been devoting time to this contract not only since the last November waiver was made, but also over the last year. Have they been involved to any considerable extent in pursuing certain legal questions that have been raised as a result of this?

Mr. MITCHELL. We have, of course, Mr. Holifield. I would not be prepared to estimate how much time it has taken, or what proportion of the time.

Chairman ANDERSON. I would not ask you to go to the trouble of documenting it, but we would be safe in saying that you have spent considerable time studying this particular contract and its related matters.

Mr. MITCHELL. Over the period of the last year, certainly.

Representative PRICE. Mr. Chairman, I think the records will show that Commissioner Murray has been consistent in his position on the Dixon-Yates contract. As I recall the evidence we have in our records, Commissioner Murray joined with two other members of the Commission as far back as last June indicating that he though that this contract was forcing the Atomic Energy Commission into a responsibility far remote from its ordinary functions.

I have seen nothing in any time since then that indicated that Mr. Murray was not consistent in his position on this contract.

Mr. STRAUSS. Mr. Chairman, I think Mr. Price is in error in thinking that Mr. Murray rejoined with Commissioner Smyth and Commissioner Zuckert. I believe the 2 of them signed a letter but I think that they were the only 2 signatories.

Representative PRICE. You are only partly right; just a moment. The chairman of the Commission is only partly correct. It is true that Mr. Murray did not sign the letter, and did not join with Dr.

Smyth and Mr. Zuckert in their letter to the Director of the Budget. But Mr. Murray did appear before this very committee at an open hearing and express that same objection to this project as Dr. Smyth and Mr. Zuckert expressed in their letter to the Director of the Budget.

Hearings held before this committee will indicate that. They will carry a statement from Mr. Murray to that effect.

Mr. STRAUSS. Before delivering this to you, Mr. Chairman, I would like to say while it is true that the General Counsel and the General Manager, and some of the Commissioners have been active in connection with this contract, any implication that the plants or the laboratories have been impaired in their work or that weapons production has suffered is an unwarranted inference. The weapons production——

Chairman ANDERSON. Has anyone made an inference that the weapons production suffered? Who was it that made that statement?

Mr. STRAUSS. I gathered from the remark by Commissioner Murray in his response to Mr. Cole, that he mentioned weapons, and if he did not I am sorry. But that is what I thought I heard.

Chairman ANDERSON. Is it your contention that the weapons program will go along with or without the attention of the Commissioners?

Mr. STRAUSS. My contention is that the weapons program is at its alltime high and has been for the year.

Chairman ANDERSON. Would you inform us, then, if the Dixon-Yates contract has been the subject of any discussion by the Commission since this waiver was granted?

Mr. STRAUSS. I said, Mr. Chairman, that I could recall no such discussion but I am not in a position to say that the opinions may not reveal it. I will be glad to have them searched, and report to you at the next session of this committee.

Chairman ANDERSON. You would not know when the last time was that Dixon-Yates contract was discussed by the Commission?

Mr. STRAUSS. I am sure that the General Manager, at numerous meetings of the Commission, has reported on the progress, but I can recall no subject of discussion because I can recall no issue that has intervened.

Chairman ANDERSON. Before you proceed with the statement, Mr. Strauss, I would like to note that we will return to the problems involved in giving industry access to classified data at a subsequent time, but in the interest of completing the Commission's prepared statement we did want to permit you to go ahead with the licensing discussion which you had prepared.

Mr. STRAUSS. Thank you, sir.

At yesterday's meeting we were asked to supply, with respect to the study groups enumerated in the prepared statement, an indication of the term of the original agreement and its extensions, the dates when they began, and the dates when they terminated. To that end this statement has been prepared, and I ask permission to offer it for the record.

Chairman ANDERSON. That will be received for the record.

(The document referred to follows:)

Study groups

Dow Chemical-Detroit Edison:
Terms of original agreement: April 6, 1951, to April 6, 1952
Term provided by first extension: April 6, 1952, to October 31, 1952
Term provided by second extension: October 31, 1952, to January 31, 1953
Term provided by third extension: January 31, 1953, to July 31, 1953
Term provided by fourth extension: July 31, 1953, to January 31, 1954

Commonwealth Edison-Public Service Co. of Northern Illinois:
Term of original agreement: May 3, 1951, to May 3, 1952
Term provided by first extension: May 3, 1952, to October 31, 1952
Term provided by second extension: October 31, 1952, to January 31, 1953
Term provided by third extension: January 31, 1953, to July 31, 1953
Term provided by fourth extension: July 31, 1953, to January 31, 1954

Bechtel Corp. Pacific Gas & Electric:
Term of original agreement: May 14, 1951, to May 14, 1952
Term provided by first extension: May 14, 1952, to October 31, 1952
Term provided by second extension: October 31, 1952, to January 31, 1953
Term provided by third extension: January 31, 1953, to July 31, 1953
Term provided by fourth extension: July 31, 1953, to January 31, 1954

Monsanto Chemical Co.-Union Electric Co. of Missouri:
Term of original agreement: June 4, 1951, to June 4, 1952
Term provided by first extension: June 4, 1952, to October 31, 1952
Term provided by second extension: October 31, 1952, to January 31, 1953
Term provided by third extension: January 31, 1953, to July 31, 1953
Term provided by fourth extension: July 31, 1953, to January 31, 1954
Term provided by fifth extension: January 31, 1954, to April 30, 1954
Term provided by sixth extension: April 30, 1954, to July 31, 1954
Term provided by seventh extension: July 31, 1954, to January 31, 1955
Term provided by eighth extension: January 31, 1955, to April 31, 1955

Foster Wheeler-Pioneer Service-Diamond Alkali:
Term of original agreement: October 10, 1952, to October 10, 1953
Term provided by first extension: October 10, 1953, to April 10, 1954
Term provided by second extension: April 10, 1954, to April 10, 1955

Atomic Power Development Associates (Detroit Edison, Dow Chemical and Associates):
Term of original agreement: February 1, 1954, to January 31, 1955
Term provided by first extension (without Dow): January 31, 1955, to March 31, 1955

General Electric Corp.:
Term of original agreement: October 9, 1953, to October 9, 1954
Term provided by first extension: October 9, 1954, to April 9, 1955

Duquesne Light-Walter Kidde: Term of original agreement: October 14, 1953, to October 14, 1954

Nuclear Power Group:
Term of original agreement: October 27, 1953, to October 27, 1954
Term provided by first extension: October 27, 1954, to October 27, 1955

Tennessee Valley Authority:
Term of original agreement: November 24, 1953, to November 24, 1954
Term provided by first extension: November 24, 1954, to November 24, 1955

Newport News Shipbuilding & Dry Dock Co.:
Term of original agreement: November 24, 1953, to November 25, 1954
Term provided by first extension: November 25, 1954, to November 25, 1955

Westinghouse Electric Corp.: Term of original agreement: February 23, 1954, to February 23, 1955

Babcock & Wilcox Co.: Term of original agreement: February 24, 1954, to February 24, 1955

American Machine & Foundry Co.: Term of original agreement: February 25, 1954, to February 25, 1955

Bendix Aviation: Term of original agreement: March 3, 1954, to March 3, 1955

Pacific Northwest Power Group: Term of original agreement: May 5, 1954, to May 5, 1955

Vitro Corporation of America: Term of original agreement: July 23, 1954, to July 23, 1955

Pennsylvania Power & Light Co.: Term of original agreement: September 21, 1954, to September 21, 1955

Bethlehem Steel Co.: Term of original agreement: September 30, 1954, to September 30, 1955

Rocky Mountain Nuclear Power Study Group: Term of original agreement: November 1, 1954, to November 1, 1955
Kaiser Engineers Division: Term of original agreement: October 11, 1954, to October 11, 1955
Consumers Public Power District: Term of original agreement: November 22, 1954, to November 22, 1955

Chairman ANDERSON. I believe we have copies of all of these agreements in our files.

Mr. STRAUSS. I sincerely hope so. If by some inadvertence it is not true——

Chairman ANDERSON. It would be a voluminous series of documents to submit and if there is no objection by any member of the committee, we will merely file this for the record and include it in the record, and not ask you to produce any of the documents. If any member of the committee feels he has to have that document, I wish you would first take it up with the staff of the committee because I believe we have them all on file.

Mr. STRAUSS. It may be possible that through some inadvertence one of them has not been sent to you. In that event it is inadvertence.

I had a short statement, Mr. Chairman, which I had intended to ask for permission of offer at the end of the hearing, but in view of the colloquy that began the hearing, perhaps you will permit me—it is only a page and a half double spaced—to put it into the record at this point?

Chairman ANDERSON. Surely, Mr. Chairman.

Mr. STRAUSS. The statement made before your committee yesterday by the Commission had been submitted to all the Comimssioners, including, of course, Mr. Murray, days before its presentation. The statement by Commissioner Murray, however, was heard for the first time by Dr. Libby and myself when Mr. Murray read it to your committee yesterday afternoon.

In the interest of those thousands of men and women who work devotedly in our laboratories and production plants, I must not allow the inference to stand that the effectiveness and the results of the Commission's efforts have been impaired by the controversy over the Dixon-Yates contract. Commissioner Murray has access to the same information we all do and surely is aware that the production of atomic weapons for our Armed Forces is at an all-time high.

During the year great progress also has been made in peaceful uses of atomic energy. Ground was broken for the first large commercial scale atomic powerplant, and design on others was begun. Research reactors and accelerators were inaugurated or authorized, such as the reactor at North Carolina State College and the Chicago Pile No. 5. Most importantly the President's Atoms for Peace proposal was launched and the international conference on the peaceful uses of the atom was initiated here in the Commission.

The accomplishments of the Commission's staff and contractors are too numerous to catalog in this statement, but our semiannual report which has just been delivered to you describes them at length. It happens that the year 1954 was the most fruitful of the Commission's history.

It is unfortunate and inaccurate to give the American people the impression of any slowdown or discontinuity in our progress as a result of the issues raised incident to carrying out President Eisen-

hower's directive in connection with the Mississippi Valley Generating Co. contract.

There have been longer hours for a few of the Commissioners and some of the top staff in Washington. There has been no effect in the laboratories and plants.

Chairman ANDERSON. May I say this is what always happens, that one statement has to bring on another, and the question is this: May I ask you, I am very much interested in the first sentence:

> The statement made before your committee yesterday by the Commission had been submitted to all of the Commissioners including, of course, Mr. Murray, days before its presentation.

Were you familiar with whether or not the Joint Committee asked for a copy of the statement in compliance with the rule carried in the reorganization act, and if so when we were told we could have it?

Mr. STRAUSS. No, sir; I do not know.

Chairman ANDERSON. Would you ask the General Manager when we asked for it?

Mr. NICHOLS. Yes, as I told you——

Chairman ANDERSON. Did you tell us on Saturday it was not yet complete?

Mr. NICHOLS. Yes, and I said we were still working on it and drafts had been submitted.

Chairman ANDERSON. I am interested in that "days before its presentation." It was presented Monday. Now, Mr. Chairman, since you made the statement, what day was it ready for presentation?

Mr. STRAUSS. It was ready for presentation on the day on which it was presented.

Chairman ANDERSON. Not on the day in which it was presented. You say it was ready days before its presentation. Which day before its presentation?

Mr. STRAUSS. I didn't say it was ready. I said the statement had been submitted to all of the Commissioners, and the purpose of submitting it to the Commissioners was for the opportunity of editing. We had a meeting all Friday morning, which had been called for that purpose, and which was attended by two members of the Commission, and the staff, at which we thought last-minute changes were made; but I believe changes in the interests of accuracy were made by the staff over the weekend.

Chairman ANDERSON. They were even working on it Sunday, were they not?

Mr. STRAUSS. I believe so, and there were editorial changes. And each of the Commissioners had a copy on Monday morning of the document substantially in the form in which it was presented to you yesterday afternoon.

Chairman ANDERSON. Did any member of the joint committee have a copy on Monday?

Mr. STRAUSS. I can't answer that.

Senator JACKSON. Could I ask a couple of questions there, Mr. Chairman?

Would it not be fair, Admiral, to say that to the extent that the Dixon-Yates contract took up a lot of time of the Commission, that obviously it made it difficult for the Commission to spend the time that they would normally spend owing to the fact of the Dixon-Yates contract?

Mr. STRAUSS. Well, I would answer that question, Senator, by saying that ordinarily speaking only for myself, I would hope to leave my office in the afternoon by 5 or 6 o'clock. For the last several months, I have been staying until 7 or 8, and I think I can ascribe the additional hours in part to this additional load, but as far as my small part in it is concerned the work of the Commission has not suffered in consequence.

Senator JACKSON. Admiral, is it not a fact that the Commission worked beyond 5 o'clock long before they ever heard of Dixon-Yates?

Mr. STRAUSS. I keep no time clocks, sir, and I do not know.

Senator JACKSON. What I am trying to say in all candor—I mean to be fair—is that you cannot say that because you worked long hours that that was due to Dixon-Yates. If you have difficult problems before the Commission, I know that you and all of the members of the Commission are conscientious, and are going to spend whatever time is necessary to do the job designated by the Congress. Is that not so?

Mr. STRAUSS. To the best of our ability, sir.

Senator JACKSON. Do you not agree that in all candor that the Dixon-Yates contract certainly did interfere with the smooth running of the Commission?

Mr. STRAUSS. I think it added to the burdens of the Commission. I don't believe I would go so far as to say it interfered.

Senator JACKSON. Now, you say the weapons program is at an all-time high, and the truth is that that is going on on a progression basis, and even if the whole Commission had to suspend for a while, the weapons program would continue. But to the extent that you have to take time out on these collateral matters, does it not interfere with the various obligations of the Commission?

Mr. STRAUSS. If I thought it did, Senator, I would be quite prompt to concede it. I do not think so.

Senator JACKSON. You will recall, to go back a little, that one of the chief complaints of the Atomic Energy Commission was the fact that they had to spend so much time on all of these community problems, like Hanford, and Oak Ridge, when they ought to be spending time on splitting the atom; is that not right? You only have so many hours in a day to do a job, and you are human beings, and every available hour should be spent on the programs directly related to the undertaking of the Commission. Is that not right?

Mr. STRAUSS. I think if the day was 28 hours long, instead of 24, for me there would be no more weapons produced, if that is your question. I don't think I have any direct effect on the weapons output by the additional time that I have put in.

Senator JACKSON. Well, you would not want another second Dixon-Yates contract?

Mr. STRAUSS. For quite different reasons than those you have mentioned.

Senator JACKSON. This might be directed to legal counsel but is it not a fact that the only agency that could handle this contract from a legal standpoint was the Atomic Energy Commission, and it was for that reason that the Atomic Energy Commission was used as the legal peg on which to hang the hat for Dixon-Yates?

Mr. MITCHELL. Senator, I am not sure what the authority of other agencies may be. I know that we did have the long-term contract authority.

Senator JACKSON. You are counsel of the Commission; do you have any other agency that would have that authority?

Mr. MITCHELL. I am not familiar as to the authority of the other agencies.

Senator JACKSON. Did you check, and perhaps counsel the Commission, why not let some other Government agency that has the legal authority to enter into these contracts handle Dixon-Yates, instead of the Atomic Energy Commission?

Mr. MITCHELL. Sir, that question was never put to me.

Senator JACKSON. Did not anyone suggest in the Commission that maybe we ought to explore and see if we can find some other Government agency that could handle Dixon-Yates? Or was Dixon-Yates such a wonderful thing for the Commission that you all wanted to hold onto it?

Mr. MITCHELL. Senator, I cannot speak for what the Commissioners may have discussed, but certainly as far as I was concerned I was never asked to explore the powers of other Government agencies.

Senator JACKSON. Are there any other Government agencies that have experience in the power field, other than the Atomic Energy Commission?

Mr. MITCHELL. I assume that there are.

Senator JACKSON. To enter into such contracts?

Mr. MITCHELL. That I do not know, sir. I assume there may be.

Senator PASTORE. It might be a good idea if the Joint Committee got off Dixon-Yates for a little bit, too.

Chairman ANDERSON. I think that we can start with the licensing.

Mr. STRAUSS. Mr. Chairman, we would propose to present this afternoon if time will permit the sections on licensing, pricing schedules, and the present status of AEC power reactor technology programs. We would request to be permitted to have the general counsel, Mr. Mitchell, present the section on licensing. And likewise, the section on pricing schedules.

Mr. MITCHELL. Mr. Chairman and members of the committee, with your permission I would like to read into the record a prepared statement on licensing.

We should like to summarize now what we have done with respect to implementing the licensing provisions of the new act.

On August 30, 1954, the date on which the President signed the Atomic Energy Act of 1954, we issued two interim orders. The first of these contained determinations as to the meaning of "production facility" and the general licensing of component parts of production facilities. These determinations were made to preclude a temporary lapse in the Commission's licensing control over facilities capable of producing special nuclear material, and to permit the continued general licensing of component parts as the Commission had theretofore defined them. The second of these orders expressly continued in effect for the time being all then-existing AEC regulations that had been published in the Federal Register insofar as not inconsistent with the new act. The licensing regulations thus continued in effect covered radioisotope distribution and the control of source material,

as well as the control of facilities for the production of fissionable material.

Since then the staff has made substantial progress on the new licensing regulations. For working purposes we have divided the regulations into eight parts, or sets, as follows:

1. Distribution and use of special nuclear material.

These regulations will set forth the Commission's requirements as to the filing and content of applications for the use of special nuclear material, the criteria for the approval of applications, and the terms and conditions to which all persons licensed to use special nuclear material will be subject. They will also outline the Commission's requirements with respect to the accounting for and physical security of special nuclear material.

2. The second series of regulations will have to do with production and utilization facilities.

These regulations will contain the Commission's determinations as to what equipment and devices constitute "production facilities" and "utilization facilities" within the meaning of the act. Activities involving these facilities will require a license. The regulations will cover the filing and content of applications for licenses, including construction permits, the criteria for their approval, the various classes of specific licenses, the terms and conditions of licenses, and the activities permitted under general license.

3. Operators' licenses: These regulations will set forth the minimum qualifications for the operators of licensed facilities and provide the procedure for determining whether applicants have those qualifications.

4. Radiological health and safety. These regulations will contain the Commission's requirements, insofar as they can be made generally applicable, with respect to the health and safety aspects of licensed activities.

5. Security. These regulations will establish requirements for the safeguarding of classified information by licensees.

6. Control of source materials. These regulations will consist of a revision of the 1947 source materials control regulations so that they will conform to the provisions of the 1954 act and Commission policy under it.

7. Control of byproduct materials. These regulations will consist of a revision of the present regulations on radioisotope distribution to reflect the changes that appear in the 1954 act.

8. Rules of practice. These regulations will implement the requirements of the new act with respect to the administrative procedures to be followed in connection with the issuance, amendment, transfer, suspension, and revocation of licenses.

Extensive staff studies have been necessary in order to provide a sound basis for these licensing regulations, and substantial progress has been made on the regulations themselves. Some of the draft regulations have reached the Commission and are now under study by the Commissioners. The staff has prepared working drafts of the remaining substantive regulations.

Our studies and our work on these regulations have indicated that it is desirable, in the interest of developing all the relevant facts and expert opinion that may bear on the problems of licensing control, to discuss those problems with members of industry and other groups

that may be substantially affected. This seems particularly true in those arrangements under which the 1954 act establishes a new or substantially modified pattern of control, or in which significant policy changes are being considered.

As the various phases of our work reach the point where discussions with representatives of affected groups appear desirable, therefore, we plan to set up conferences for that purpose. The problems faced by both industry and AEC under the new act and the impact of licensing control upon industry will be thoroughly explored. These industry conferences will not be a substitute for the opportunity given the public, through issuance of notices of proposed rule making to comment on any AEC regulations before they are actually placed in effect.

The conferees selected for attendance at any meeting or series of meetings will be selected with a view toward obtaining representation of a true cross section of the industrial and other groups affected, with due consideration given to geographic distribution, size of company, public or private ownership, and other relevant factors. In order to keep the attendance at workable proportions and maximize the value of the meetings, we plan to schedule different meetings with major different segments of industry that are concerned.

The Commission has taken a number of important steps designed to provide the necessary foundation for the broadened industry participation that the licensing provisions of the new act contemplate. Some of these steps such as the broadened study agreement program, the establishment of a "gray area" of classified information, and the simplified "L" clearance procedure have already been discussed.

Others, such as the adoption of basic schedules of prices that AEC will pay for special nuclear material produced by licensees, and the charges that AEC will make for materials and services furnished to licensees, and the power demonstration reactor program will be discussed later.

With the stimulus provided by the 1954 act, industry interest in peacetime applications of atomic energy is accelerating rapidly. Much of this interest will generate applications for AEC licenses. Already the number of private groups making plans to build their own research reactors is increasing. In addition to the research reactor in operation at North Carolina State College, the University of Michigan, and the Pennsylvania State University are planning research reactors. The University of California at Los Angeles is planning to build and operate a reactor especially designed for medical therapy and research. Other educational institutions, research organizations, and industrial firms are actively considering reactor projects.

There are, of course, difficulties which must be overcome lest they act as a deterrent to industry's participation in atomic energy activities, particularly in the development of commercial atomic power. Some of these difficulties are technical ones. These technical problems include such things as increasing the safety and efficiency of reactors and reducing the high capital costs, as well as the costs of processing irradiated fuel elements.

In addition to such technical challenges, there are other potential difficulties to be overcome—difficulties which may require the coopera-

tion of the Joint Committee on Atomic Energy in respect to changes in the present law. One of these involves the stability of the prices the Government will pay for the materials produced by licensees. The 7-year limitation on the period for which the Atomic Energy Commission can guarantee prices for privately produced special nuclear material, as set forth in the 1954 act, may create difficulties for licensees in obtaining financing through normal commercial channels.

Another potential problem, which may require changes in the law if there is to be the fullest possible industry participation in this program concerns risks involved in the operation of power reactors.

The Commission has enjoyed an extraordinary reactor safety record.

This record can be attributed, we believe, to three factors: First, there has been extreme care exercised by personel in the design construction and operation of reactors; secondly, much credit is due to the strict criteria laid down by our Reactor Safeguards Committee; and finally, we have been providentially blessed with good fortune.

But, inevitably, as more and more reactors are built and used, familiarity will breed some degree of contempt for the dangers. We must expect that at some future time our luck will run out and an accident may set free radioactive contaminants.

If and when this event occurs, we must not forget that progress in all the arts—including many of those which have become vital accessories to the everyday lives of all of us—has been accompanied by great risk to life and property without, however, diverting us from our objective. In the same spirit, we cannot avoid the calculated risks involved in this new opportunity which holds such promise for man's betterment.

Damages from a major accident, if one should occur, might well be beyond the capacity of most companies and communities to handle and cannot now be fully covered by insurance. Although it goes without saying that no company would knowingly construct a dangerous reactor, the possibility of accident nevertheless is a necessary consideration.

The Commission is presently engaged in providing security clearance to casualty insurance representatives, so that they may study available AEC data and give us the benefit of their experienced judgment.

Mr. STRAUSS. Mr. Chairman, that concludes the presentation of the Commission's section on licensing in the report. Would you wish to question us on that, or do you wish to have us proceed to the next section which will discuss our pricing schedules?

Chairman ANDERSON. I think we had better proceed on this because when we get to the pricing schedules we are going to recognize a part of that discussion will have to be in executive session and part of it can be in open session. Therefore, we might be able to finish the licensing here, and part of the pricing schedule will be open; but I would prefer to take care of the licensing part first.

Senator GORE. I had one question on the testimony of yesterday before we get to licensing.

Chairman ANDERSON. I had stated earlier we were reserving the right to go back to the testimony of yesterday and I had some questions on it, too. I was trying to get on to the sections here. Have you a single question or two that you wanted on that?

Senator GORE. There is only one subject on which I wish to ask a question. There might be more than one question on that subject.

Chairman ANDERSON. Let us see how far we can get alng with it.

Senator GORE. Mr. Strauss, on page 13 of the statement which Commissioner Libby read yesterday, I have no preference as to who will respond to the question, but I notice that the information is to be placed in information depositories. I wondered just how it would work out if a citizen writes the Atomic Energy Commission or if an industry writes to the Atomic Energy Commission, or if he writes to his Senator or Congressman for information. Are we to refer them, or will the Commission refer them to the Atomic Industrial Forum, or Standard Research Institute, or these other four depositories?

Mr. STRAUSS. I would think, Senator, whichever is most convenient. This is all unclassified information and to the extent that reprints are available the Commission would supply it or the Public Printer would supply them. To the extent that they might be very lengthy documents of which only one copy was available, the inquirer would be referred to the library where they happen to be deposited.

Now, that is an off-the-cuff answer, but I believe it to be accurate. If the Director of Information Services of the Commission is in the room, Mr. Salsbury, is there anything to modify that answer, to make it more correct?

Mr. SALSBURY. I think it might be noted, Mr. Chairman, and members of the Committee, that those who write directly to the Commission are responded to directly and the establishment of the information depositories is for the purpose of giving regional service on a reference basis so that people will not have to travel long distances to get particularly the mechanical drawings and that sort of thing to refer to.

Senator GORE. If I understand you correctly, taking the two answers into consideration, these particular depositories will be supplied the information and they will have the privilege of duplicating if they desire and disseminating and responding to requests or orders for this information to their own clients, or their own associates?

Mr. SALSBURY. They will give photo duplicating services if anyone wants to purchase it from them.

Senator GORE. But that will not, as I understand you to assure us, prevent the Atomic Energy Commission from replying directly to citizens and industries who may write directly to the Atomic Energy Commission?

Mr. SALSBURY. Not in the least, sir.

Senator GORE. Well, Mr. Strauss, I am familiar with the Stanford Research Institute, and Georgia Institute of Technology, but would you identify the Atomic Industrial Forum of New York, or in New York?

Mr. STRAUSS. I believe I can identify that, Senator. It is composed of a nonprofit organization which began its existence within the last 12 or 18 months, composed of individuals and industries interested in the peaceful uses of atomic energy, and with its headquarters, I believe, in New York. It has received some assistance from foundations, and it derives some part of its support from annual contributions from the various members who compose it.

Senator GORE. Can you identify the president of this organization?

Mr. STRAUSS. No, sir, but I believe I can supply the name without much difficulty.

Senator GORE. Would it be Mr. Cisler, president of the Detroit Edison Co.?

Mr. STRAUSS. He was at one time the president and may still be. Whether they change annually or not I do not know.

Chairman ANDERSON. Do you not know him to be the president?

Mr. STRAUSS. I am not sure, Senator. I did not want to testify that I knew he was president.

Chairman ANDERSON. Did you have someone on your staff who does know?

Mr. STRAUSS. I understand he was until the end of 1954, and whether his term expired or not there is no one here who knows. We will be glad to supply that information.

Senator GORE. I was informed this morning that he is still the president, and I am not sure that that information is correct. Are you acquainted with the public relations firm in New York of Bozell & Jacobs?

Mr. STRAUSS. I never heard of them to my knowledge, sir.

Senator GORE. You are not aware of any possible connection between that firm and the organization of Atomic Industrial Forum?

Mr. STRAUSS. I would have no occasion to know, Senator. I know of no such connection.

Senator GORE. Are you aware of the fact that a former Commission employee, Mr. Trapnell, is reportedly now an employee of Bozell & Jacobs?

Mr. STRAUSS. No, I knew Mr. Trapnell was going into private employment, and I believe the name of the firm was mentioned to me, but it did not register with me.

Senator GORE. Does Mr. Trapnell occupy the status of a consultant with the Commission at this time?

Mr. STRAUSS. He may. I am sorry to say I cannot answer; but he may.

Senator GORE. Would you consult your staff, and ascertain if that is true?

Mr. NICHOLS. I believe he does. I authorized it, but whether it has been signed or not, I do not know.

Senator GORE. You authorized that?

Mr. NICHOLS. Yes.

Senator GORE. Would that entitle him to a "Q" clearance?

Mr. NICHOLS. Yes, sir.

Senator GORE. Are you aware of the fact—that is all, Mr. Chairman.

Chairman ANDERSON. Mr. Trapnell himself announced he was a consultant.

Mr. NICHOLS. That is right, he announced it.

Chairman ANDERSON. Are there any other questions on this provision?

Mr. STRAUSS. Might I ask a question, Senator? Is there any reflection that the Commission should take note of, Senator, in connection with Mr. Cisler's name?

Chairman ANDERSON. You are representing that they go to these firms for their information, and these are the ones that are available.

Now, are these firms that are being financed by the electric industry, and I have no idea of what Senator Gore was leading to, but it naturally occurred to me that these are the firms that the electric industry are financing as a source of information.

Mr. STRAUSS. I have never seen a list of the contributors to the Atomic Industrial Forum.

Chairman ANDERSON. Before you recommend it, would you not ask that question naturally? If I come to you and ask will you give money to the Salvation Army, you know what the Salvation Army is; but if I come to you and say "Will you give money to the Sons and Daughters of I Will Rise," you want to know who is in it. You have recommended very highly the Atomic Industrial Forum of New York. Who is in it?

Mr. STRAUSS. The names which were originally associated with it when it was formed were names of men known to me, and to you gentlemen of the highest probity and standing, and it would never occur to me to question their reliability or their integrity and the enterprise in which they have embarked.

Senator JACKSON. The only question I had, Mr. Chairman, and I knew nothing about it until this question was asked, but there is one question which I am sure must be on the mind of anyone who has just followed this question and answer.

There is one word you left out, and you referred to their integrity and so on, but I am wondering about their impartiality?

Mr. STRAUSS. Anyone who comes to them can get this information. They have no discretion as to who gets it.

Senator JACKSON. I gather that Mr. Cisler is with the Detroit Edison; is he not?

Mr. STRAUSS. I believe so.

Senator JACKSON. Apparently a very fine and honorable man, but is he not quite interested in the reactor development program?

Mr. STRAUSS. I am sure he is, but not to the disadvantage of anyone else, so far as I know.

Senator JACKSON. Well, my understanding of free private enterprise is that competition is the driving force in it, and I do not know why he would not want to get ahead of anyone else. I would not think much of him if he did not.

Mr. STRAUSS. There isn't competition between private utility companies, Senator. They are franchised and operate in areas without competition. It is the essence of the utility business. Competition is perhaps less prevalent there than in any other thing.

Senator JACKSON. I agree with you, but there is a great interest on the part of private utility people to get ahead of the people in the public-utility business to the extent that they can reach out in the atomic-energy field, and develop and build reactors that will be more efficient and far more effective than what the public utilities people might be able to do.

Mr. STRAUSS. I confess I do not understand, because if the inference is that either of these depositories were holding information from anyone, the Commission upon finding that out would take action. We have no such charge having been made, and I know of no such allegation.

Senator JACKSON. Let me just finish this one point here. I do not question his integrity, but the only question I raise, Admiral, is

a question of impartiality. In other words, they are running a nonprofit organization, that is supposed to be a public depository, of information in the peaceful atomic area. I question whether it is sound public policy to have as an agency to disseminate that information a group of people who have a direct and personal interest in this field.

Now, the situation is entirely different with respect to Georgia Tech and Stanford.

Mr. STRAUSS. I have just been informed, Senator, that one of the participants in the Atomic Industrial Forum is a labor union.

Senator JACKSON. I do not care about that. To me I am not arguing, I have just made it very clear, Admiral, that two wrongs do not make a right.

Mr. STRAUSS. I do not know of any wrong.

Senator JACKSON. I do not care whether labor is in it or business; but I want to know whether they are fair or impartial.

Mr. STRAUSS. I believe them to be fair and impartial. Upon any allegation that they were not fair and impartial, the Commission, I am sure, would take it under consideration, and take action. But I have heard no allegation to that effect.

Senator JACKSON. Well, do you think it is sound public policy to have an agency to be a public repository for the Commission that has a direct interest in the program? It makes it difficult for you folks; does it not? What if someone comes along and says that information has been withheld and then you are in a tough spot, and they say "Well, these people have a direct interest in not giving all of the information that has been cleared for public release?"

Mr. STRAUSS. That is a hypothetical condition, you will concede, and it has not occurred and no one has made any such charge.

Senator JACKSON. They have not made the charge, but I think that when you are running a public agency, you want to anticipate the possibility of that situation arising. I am not impugning anybody's motives.

Mr. STRAUSS. You will find that this pattern is followed in other parts of the Government, that there are documents of the Department of Agriculture, and other departments of the Government which are available through private, not private but nonprofit, agencies which are not Government agencies, and where they can be obtained as a matter of convenience by the citizens.

Now, if there is ever an occasion when the Commission has reported to it that a legitimate request for documents or information of an unclassified character in the possession of either of these depositories is requested and not provided, I can assure you that we would take prompt action.

Senator GORE. Mr. Strauss, would you mind informing the committee on what basis a former employee retains a "Q" clearance as a consultant, after he has accepted employment with a private concern intensely interested in this field? If you cannot supply it, perhaps you could persuade the General Manager to explain why he approved it.

Mr. STRAUSS. I will ask the General Manager to supplement this statement, Senator: It is not a departure from a practice which has been common in the Commission since the Commission was organized.

Senator GORE. I did not wish to imply any wrongdoing on the part of any, and do not do so. I would like to inquire if Mr. Trapnell is an engineer, or if he is a scientist, or on what basis he is to be of benefit to the Commission or is the consultation for the benefit of his present employers?

Mr. NICHOLS. He is signed up as a consultant in case we desire to use him on our business and there is nothing that I know of in this contract to be given to him pertaining to advertising work.

Senator GORE. What is his specialty?

Mr. NICHOLS. His specialty has been public relations.

Senator GORE. He is not a scientist?

Mr. NICHOLS. I do not believe so.

Senator GORE. He is not an engineer?

Mr. NICHOLS. No, but he has a lot of long experience.

Senator GORE. He is an engineer?

Mr. NICHOLS. I don't believe he is. He may be, but I am not certain.

Chairman ANDERSON. Do you know if he is not?

Mr. NICHOLS. I don't know, but I don't think he is.

Representative COLE. I would like to speak a word in behalf of Mr. Trapnell. He has been associated with the Commission as liaison with the Congress for the last few years. I understand that he is an engineer, and an electrical engineer, and I want to testify openly to his capacity, and his fairness, and his effectiveness, and his honor, and his good judgment; and I do not consider that he did a single thing wrong in applying for a position as consultant, nor did the Commission commit an error in granting it to him.

The Commission has a number of consultants, as individuals, who are engaged in private enterprise, and private endeavor in one way or another. I think it is very wrong to draw any inference that Ned Trapnell did an improper deed, or that he is a person of doubtful repute.

Senator GORE. Mr. Chairman, if that statement by the Congressman from New York indicates that I have drawn any implication of impropriety or wrongdoing on Mr. Trapnell's part, I wish to call attention to the fact that I specifically say I had no such intention. But I do think this committee should be concerned with "Q" clearance given a public-relations consultant for future consultation after he has accepted employment with the concern that specializes in the private utility field.

Senator HICKENLOOPER. Mr. Chairman, I would like to ask either Chairman Strauss or the General Manager if you can, either of you, tell me how many former Commissioners of the Commission have been retained after they have separated themselves and go into very profitable employment, as a rule, as consultants to the Commission?

It runs through my mind that all of the former Commissioners, at least for a season after they separated themselves, have been retained as consultants with "Q" clearance. I may be in error about that.

Mr. STRAUSS. It would be necessary to check the records on that, but I can give you an instance that would be even more, I think, closer home, and perhaps amusing.

When I resigned from the Commission, "Q" clearance was continued as a consultant, not to the Atomic Energy Commission but to

the Joint Committee on Atomic Energy, so that a very upstage precedent was established there.

Senator HICKENLOOPER. Let me go further and ask if you recall, I cannot make the categorical statement of all of the former Commissioners, that all of them have been retained as consultants; but it is my impression that they have all been retained as consultants for at least a season of time, and perhaps some of them are still consultants with "Q" clearance.

Let us get down to the former General Managers.

Mr. NICHOLS. Could I make a statement on the Commissioners? For example, yesterday I okayed a job for Dr. Smyth that we wanted done, and I think Dr. Libby has asked for Dr. Smyth to come back and consult with him in regard to certain matters.

Mr. STRAUSS. I remember, Senator, that I asked the General Manager to execute a consulting contract with Mr. Zuckert, as a personal consultant to myself.

Senator HICKENLOOPER. Going into another echelon, may I ask about the former General Managers, and Assistant General Managers, whom I am of the opinion, although I cannot make this categorical statement either, that they have all been retained, at least for a season of time, as consultants to the Commission?

Mr. STRAUSS. I recall some former General Counsels of the Commission who left to go into profitable enterprises, as a result of their experience on the Commission probably, who have been retained as consultants to the Commission. This is over the years past.

Now, it runs in my mind that the fundamental reason given for naming them as consultants, after they have terminated their services with the Commission, has been that on occasions it is desirable for the Commission, or it may be desirable to ask them to come back and give some consultive advice on matters which may have gone through their hands or on which they had knowledge while they were with the Commission. In order to discuss information of that kind with them, under the law, I believe it is essential that they have a "Q" clearance at the time of discussion.

Is that generally the situation?

Mr. NICHOLS. That generally is the situation.

Senator HICKENLOOPER. We can say that there are literally dozens of those formerly associated with the Commission in important capacities who have at least for a time been retained on a consultant basis, and some have been from time to time called in for consultation on matters of which they had knowldege while they were with the Commission. Is that substantially correct?

Mr. NICHOLS. That is correct, as far as my experience is concerned.

Senator HICKENLOOPER. There is nothing new about this matter.

Mr. STRAUSS. It is the only way about which we could compensate them for the time loss, and pay their traveling expenses if they live out of the city.

Senator HICKENLOOPER. If you have occasion to consult them about something in the interest of the Commission, at a time after they have severed their official connection with the Commission?

Mr. STRAUSS. That is correct.

Chairman ANDERSON. Perhaps we ought to find out if we are going to need to hold a night session here tonight, because we have to finish this subject and the pricing subject and several others before the

afternoon is over. The only part I regret is that there has been some statement here that would make it look as if someone was trying to impute Ned Trapnell's motives. I think he is a fine person and I think he studied engineering at some time in his life. I do not think he has been practicing it for a long time. I studied social work 20 years ago, and I have not been a social worker and I would not classify myself as such, but I do not think that that would reflect on Trapnell in any way. We all were sorry to see him leave the Commission.

Mr. STRAUSS. So were the Commissioners.

Chairman ANDERSON. The question that Senator Gore raised was what connection does he now have with a firm that may be selling services as a result of his "Q" clearance?

Senator GORE. It does seem significant to me, and I do want to reemphasize, that I, too, think Mr. Trapnell is a fine man. He is a good citizen. But I think it is a matter of note, that not even the Commissioners know or seem to know that he had been retained as a consultant with a "Q" clearance.

Mr. Strauss, does not the Commission exercise some supervision over clearances? We spent some hours yesterday about how the average citizen or the average consulting engineer, or the REA's would establish study groups, and then you would finally give them an agreement whereby they would have "L" clearance, but here apparently without the knowledge of the Commission, former employees, bingo, are retained as consultants with "Q" clearance.

Mr. STRAUSS. I don't think it is bingo, I don't think it is quite as common as that.

Senator GORE. You withdraw "brainwashing," and I will withdraw "bingo."

Mr. STRAUSS. You say this concern which he has been connected with was connected in some way with the Atomic Industrial Forum. That must have antedated Mr. Trapnell's connection.

Senator GORE. May I venture to correct that? I asked you if you knew the connection.

Mr. STRAUSS. I thought you had stated it as a fact. I know nothing of it.

Senator GORE. As I understand it, this concern in New York, Bozell & Jacobs, specializes in the private utility field, and that they had some connection with the Atomic Industrial Forum.

Mr. STRAUSS. If they have, I assume that in the absence of information to the contrary which I would undertake to obtain, that that connection between Bozell & Jacobs with the Atomic Industrial Forum antedated Mr. Trapnell's connection with them, and that no inferences can be drawn therefrom since Mr. Trapnell's separation from the Commission is of very recent and lamentable date.

Chairman ANDERSON. Now, Mr. Chairman, we have no rule of relevance in the Senate. I am not going to try to enforce it while we go through the licensing provisions and go to Mr. Durham, first.

Representative DURHAM. I pass for the present.

Chairman ANDERSON. Senator Pastore.

Senator PASTORE. I have no questions.

Chairman ANDERSON. Congressman Holifield.

Representative HOLIFIELD. At the bottom of your page, you say the 7-year limitation on the period for which the Atomic Energy Com-

mission can guarantee prices for privately produced special nuclear material, as set forth in the 1954 act, may create difficulties for licensees in obtaining financing through normal commercial channels. I would like to explore that for just a minute.

As I understand it now, the Commission under the new act is allowed to set a fixed price which lasts for 7 years on privately produced special nuclear material. I would understand that to mean plutonium possibly or uranium 235.

Mr. MITCHELL. Yes, sir.

Representative HOLIFIELD. We gave that quite a bit of consideration in writing the law. We came to the conclusion in view of the increased efficiency in the producing of special nuclear material that there must be some limitation on contracts, because if there is any place where a hidden subsidy can be extended to industry to retire their capital investment by a contract which will bind the Government to purchase everything that they produce, it is in this particular area. So we deliberately set a limitation on that with the thought that at the end of the 7-year period there would be a new determination of price on the basis of the increased efficiency of the technology, and for the interest of the Government to give the Government the benefit of any cheaper costs which might have accrued during that 7-year period.

I want to ask you this question. Does the Commission feel that its obligation is to provide contracts, for instance, 25-year contracts like the Dixon-Yates contract, so that you can guarantee these private industries the return of all their capital investment and profits and so forth? Is it your obligation to guarantee these industries that produce nuclear material a guarantee on their financing, or is it your interest to buy for the Government as cheap as possible this product which is needed by the Government?

Mr. MITCHELL. Mr. Holifield, I don't think we had in mind here at all any idea of guaranteeing profits or total return. What we did have in mind was this: If an industrial concern that wanted to come into the program in connection with its financial planning needed to take account of the price at which it could sell nuclear material produced to us, and you assume now at the time the plan is firmed up it is going to take 3 years to build the reactor and perhaps 4 years of operations under it, we thought perhaps—we don't know yet, it might well be—the 4-year period of actual sale would not be long enough so that the concern in question could obtain adequate financing.

Representative HOLIFIELD. If the concern cannot get adequate financing on a 4-year guaranteed market or a 7-year guaranteed market, how many years do you think the Government should give them a guaranteed market?

Mr. MITCHELL. I am not prepared to say, sir. What we are saying is that this may be something that we will run into. We recommended 10 to the committee last spring. That again we were not entirely sure would be adequate, or it may be more than enough. I think the only way we can answer this one is to say that this is something that is ahead of us, and if we find this is a deterrent, we may come back to the committee and ask for further authority.

Representative HOLIFIELD. Have you had any indication from industry that a guaranteed price for the product for 7 years is going to be too short a period?

Mr. MITCHELL. I think I would like to ask the General Manager to answer that.

Mr. NICHOLS. Some have indicated that is too short.

Representative HOLIFIELD. In other words, private industry that was so anxious to get into this thing on a private-industry basis now needs a little additional incentive.

Mr. NICHOLS. They have not indicated that yet. In informal discussions some have indicated this is a pretty short period, because it may take them 3 to 4 years to build. This is the best we can do. They recognize that. We are just passing on the type of information which I consider this 202 report called for. In other words, we put this down as a possible anticipation.

Representative HOLIFIELD. The problems that you run into in getting industry to take hold of this new industry and develop it.

Mr. NICHOLS. Later in the demonstration power-reactor program we will indicate that will tend to bring out some of these things. Either we have a workable scheme or we haven't.

Representative HOLIFIELD. I believe further on you also bring out the insurance position.

Mr. NICHOLS. Yes, sir.

Representative HOLIFIELD. In other words, the private insurance companies have shown no desire to go into this on a private-industry basis unless they have Government standing by to pick up on their insurance.

Mr. NICHOLS. No, sir; that is not completely correct. The difficulty they have is the lack of experience in this field, to know what is the experience record. That is the way they do everything, statistically. Here you are starting out in a new industry and there are not enough statistics available to give them an experience record. So the insurance companies have indicated to us informally in some of our discussions that may be the most they could cover in five to ten million dollars damage in case of an accident. They could cover that, they think. The question comes up if you have a big disaster which goes beyond that, similar to the problem the insurance companies had in war risk insurance in case of a big bombing attack, it might be enough to break them. So it is a problem of reserves in a given field, and statistics in a given field. That is, the record of experience. That is not yet a final solution. In our informal discussions that has been indicated as a potential problem. We are presently convening a group of insurance men to see if we can get a better answer on that.

Representative HOLIFIELD. In the production of nitroglycerine and other dangerous materials in which the hazard is great, did the Government take these people by the hand and guarantee them against any damage claims in the development of their industries?

Mr. NICHOLS. I don't believe it did, but they had a case where they built up experience where they know how many million dollars of nitroglycerine are produced per man blown in the air.

Representative HOLIFIELD. But until they built that up, private industry took the risk.

Mr. NICHOLS. They could do it. There is a potential in the nitroglycerine explosion where you can see a reasonable limit to their risk. Here some people have indicated that in case of a great sequence of events—perhaps they may never occur, but theoretically possible—

you could have a much bigger disaster than in any type of normal commercial enterprise. It is just that extraordinary hazard that we are looking for a way to cover, not the day-to-day stuff, and the possibilities of a small accident.

Representative HOLIFIELD. It is interesting to me that all of these industrial groups which beat tom-toms and put articles in national magazines and build up a great propaganda drive that now is the time for private industry to come in and do a job, are suddenly becoming a little coy. They don't want to plunge in. They are putting their big toe in the water, and say it is a little cold; will the Government give us a little incentive?

Mr. NICHOLS. That is not universal. Some may find ways and means of doing it. We have to wait and see. We did want to join the Joint Congressional Committee as a result of our discussions here on two potential problems that may develop. We are not yet in a position to recommend any legislation on it.

Representative HOLIFIELD. That is all, Mr. Chairman.

Chairman ANDERSON. Mr. Cole.

Representative COLE. I have no questions, Mr. Chairman. It seems to me the counsel's statement on rules and regulations under licensing is itself so vague and indefinite that it does not adapt itself to specific inquiry. It is understandably so, because this whole question of rules and regulations with respect to licensing is still in the embryonic stage. There is nothing concrete for us to discuss. We can anticipate situations but I doubt if it is worthy of spending much time today. I have no questions, Mr. Chairman.

Chairman ANDERSON. I would like to ask a few questions, because we have a vote coming soon.

You granted a license to the Department of Defense, did you not?

Mr. STRAUSS. That is right, Senator.

Chairman ANDERSON. Is that the first license granted by the Commission to somebody else to possess special nuclear material?

Mr. STRAUSS. It is true, but it is not typical of other licenses which will be subequently granted. This is to another lepartment of the Government.

Chairman ANDERSON. Does that account for the fact that the terms may not be what the terms may be in a normal license?

Mr. STRAUSS. It will account for it.

Chairman ANDERSON. Have the terms of the license ever been published?

Mr. STRAUSS. I don't believe they have, Senator.

Chairman ANDERSON. You do not regard them as generally applicable?

Mr. STRAUSS. They are not. They are for a very specific purpose. I don't think it is classified. On the other hand until the Department of Defense concurs, perhaps you would prefer to have us mention it on some other occasion.

Chairman ANDERSON. Your practice is really only to licenses and not to rules and regulations. Why is that?

Mr. STRAUSS. I will ask counsel to answer that.

Mr. MITCHELL. I am not sure I understand that question.

Chairman ANDERSON. Why is it that your rules of practice relate only to licenses and not to rules and regulations?

Mr. MITCHELL. The rules of practice, Senator, that will issue in this context will be rules that will apply to all licenses. That is, the administrative procedures which we will follow in connection with our issuance, suspension, revocation of licenses, and matters of that kind, instead of repeating these in each set of regulations on each type of license, we propose to issue a set of regulations that will cover all of them in these respects.

Chairman ANDERSON. Does not section 181 make administrative procedures applicable to Atomic Energy Commission agency action?

Mr. MITCHELL. Yes, sir; that is what this regulation will be designed to cover.

Chairman ANDERSON. Is that not the action which is defined in the Administrative Procedure Act?

Mr. MITCHELL. The issuance of licenses would be one kind; yes, sir.

Chairman ANDERSON. Is not, then, the first regulatory requirement to issue a regulation on how you will issue your rules and regulations?

Mr. MITCHELL. If I understand you, Senator, I don't think we need to issue rules as to how we will issue rules. What we have in mind here is the rules that will apply to the regulations that we do issue. Of course, we will have to have this out at the time our first substantive regulation comes out.

Chairman ANDERSON. I must leave now for the Senate floor for a vote.

Representative COLE. If you do not mind, we might carry on.

Chairman ANDERSON. Go right ahead.

Mr. NORRIS. I believe the Senator left off at the place where he was asking about rules and regulations of the Commission. Couldn't the agency proceeding include rules and not just licenses?

Mr. MITCHELL. That is right.

Mr. NORRIS. Therefore, in order to establish rules you have to establish the procedures for issuing the rules.

Mr. MITCHELL. I think certainly we have the initial determination as to what is the rule within the meaning of the Administrative Procedure Act. This may be a single action or a regulation that applies across the board. If it is a rule as to a particular case, we don't have to publish, of course.

Mr. NORRIS. How can you have rules for a particular case?

Mr. MITCHELL. I think you will find it has been so construed.

Mr. NORRIS. The definition of the rule is the whole or any part of any agency's statement on general or particular applicability.

Mr. MITCHELL. General or particular.

Mr. NORRIS. Yes. In order to make the rules you have to first set up the methods which you are going to pursue in issuing the rules.

Mr. MITCHELL. If I read the Attorney General's manual correctly, we don't have to publish every rule.

Mr. NORRIS. You are operating under the Attorney General's manual and not under the Administrative Procedure Act?

Mr. MITCHELL. The Attorney General's manual is the most authoritative guide I know of to the interpretation of the Administrative Procedure Act.

Mr. NORRIS. You don't believe that the administrative procedures have first to be set up before you issue rules and regulations for the conduct of the new industry?

Mr. MITCHELL. I come back to what I said before, that we will have to have our administrative procedures published at the time we issue any substantive regulations on licensing.

Mr. NORRIS. And you don't think you have to issue those rules and regulations pursuant to the procedures set up?

Mr. MITCHELL. I am not quite clear that I understand what you are driving at, sir. I don't think we have to set up rules as to how we issue rules.

Representative PRICE. I would like to explore with the Commission for a moment some of the matters pertaining to feed material facilities.

Under licensing provisions would it be possible for you to grant a license to a private company to process feed materials?

Mr. MITCHELL. Yes, sir. I assume you are talking now about processing source materials.

Representative PRICE. That is correct.

Mr. MITCHELL. Surely we could issue source materials licenses.

Representative PRICE. Have you ever had any offers from companies to get into that program?

Mr. NICHOLS. Yes, sir; we have had some discussions with companies to try to get in the program. We consider at this particular stage the time available in order to meet our production schedule did not permit us to open it up at this time, plus the fact that the changes in specifications are still fluctuating so widely that we didn't consider it the proper way to do our business for our work at this time.

However, certainly in the future, we anticipate as you build an atomic power industry, that this is one of the things we would hope that private industry would pick up and do, and they would do it under a license.

Representative PRICE. There was a time when that was a pretty specialized operation when there was not too much knowledge on the subject, so that there would not be private companies available to do that kind of work.

Mr. NICHOLS. It would be most difficult to try to get competition on this and try to set your specifications for it, plus the time it would take. We felt if we just negotiated a contract with someone we would ultimately end up with practically a cost contract, the same as we are planning to proceed. But time and the fact that our demands here are still in the fluid state dictated that particular decision.

On other parts of our processing, as out in the West, we are relying on private industry to come up with proposals and do this type of work for us under contract.

Representative PRICE. So now the reason that you continue in the practice of doing this through Commission operators and contracts is solely because of the urgency of the program?

Mr. NICHOLS. That is right. I couple with urgency the still fluid state of some of the things we want to do. That ties into urgency. Those were the governing conditions that determined the way we would do it.

Representative PRICE. It is still approaching the stage where it will assume a competitive business.

Mr. NICHOLS. Yes, sir. I think the fact that one company came up to discuss this matter with us indicated they felt this is approaching the stage where they can get in. In fact, they found they could get the financing. But with the type of contract we would need, we

would have quite a job signing, because of the doubt and the urgency. We would have only one company to pick from.

Representative PRICE. There has been only one company that has come up with a proposal?

Mr. NICHOLS. That I know of; yes, sir. Certainly this is a field where licensing should apply in the future, and our plans are that it will.

Representative PRICE. Thank you.

Representative DURHAM. Since this is more or less in a nebulous state, will you submit for the record the two agency orders as issued on August 30 for the record? The regulations, of course, you cannot determine when they are going to be ready for discussion. I do not know where the discussion would lead us without knowing the regulations you are going to operate under. If you will submit the regulations for the record when you have them ready, to follow this discussion here, that would be helpful.

Mr. MITCHELL. It may be some time before we have them prepared. The August 30 regulations we can give you immediately.

Representative DURHAM. You are not going to issue all of these at one time?

Mr. MITCHELL. Some of them are interrelated, so I think we will have to hold a good many of them up until we have a package ready.

Representative DURHAM. The request is that as they are ready, you submit them to the committee.

Mr. MITCHELL. Of course, we would do that.

(The information referred to follows:)

TITLE 10—ATOMIC ENERGY

CHAPTER 1—ATOMIC ENERGY COMMISSION

CONTINUATION IN EFFECT OF EXISTING CONTROLS CONSISTENT WITH ATOMIC ENERGY ACT, 1954

Pursuant to the Atomic Energy Act of 1954 (Public Law 703, 83d Congress) and section 4 (a) of the Administrative Procedure Act of 1946, as amended (Public Law 404, 79th Congress), the following note affecting Title 10, Chapter I, Code of Federal Regulations, entitled "Atomic Energy Commission," is promulgated as a rule of Atomic Energy Commission.

NOTE: Until further order of the Atomic Energy Commission, all provisions of rules, regulations, and notices, published by the Atomic Energy Commission in the Federal Register under the authority of the Atomic Energy Act of 1946, and in effect immediately prior to the effective date of the Atomic Energy Act of 1954, are continued in force and effect to the extent that they are not inconsistent with the Atomic Energy Act of 1954. The term "fissionable material," as used in such rules, regulations, and notices, means special nuclear material as defined in the Atomic Energy Act of 1954.

RULES AND REGULATIONS

Effective date. This rule is effective as of the effective date of the Atomic Energy Act of 1954. Notice and public procedure is omitted for good cause found by the Atomic Energy Commission on the ground that such would be contrary to the public interest by reason of the fact that the public health and safety and the national defense necessitate the uninterrupted continuation of the effectiveness of all existing controls. However, the provisions hereof are considered as interim provisions by the Commission and comments by all interested parties are invited.

Dated at Washington, D. C., this 30th day of August 1954.

K. D. NICHOLS,
General Manager.

[F. R. Doc. 54-6920; Filed, Sept. 2, 1954; 8:45 a. m.]

PART 50—CONTROL OF FACILITIES FOR THE PRODUCTION OF FISSIONABLE MATERIAL

DEFINITION OF PRODUCTION FACILITY

Pursuant to the Atomic Energy Act of 1954 (Public Law 703, 83d Congress) and section 4 (a) of the Administrative Procedure Act of 1946, as amended, Public Law 404, 79th Congress, Title 10, Chaper I, Part 50, Code of Federal Regulations, entitled "Control of Facilities for the Production of Fissionable Material," is amended as set forth hereunder.

1. Amend § 50.2 by adding the following new paragraph (g).

(g) The Commission has determined pursuant to section 11p of the Atomic Energy Act of 1954 that the term "production facility" includes all facilities for the production of fissionable material as defined in this part. The Commission has also determined that the general licensing of items in Schedule B pursuant to § 50.12 (b) will not constitute an unreasonable risk to the common defense and security.

2. Amend § 50.12 by deleting paragraph (c) thereof.

(Pub. Law 703, 83d Cong.)

Effective date. This order is effective as of the effective date of the Atomic Energy Act of 1954. Notice and public procedure is omitted for good cause found by the Commission on the ground that such are impracticable by reason of the fact that due and timely execution of the Commission's functions in giving effect to the Atomic Energy Act of 1954 would be impeded by such notice and procedure. However, the provisions hereof are considered as interim provisions by the Commission and comments by all interested parties are invited.

Dated at Washington, D. C., this 30th day of August 1954.

K. D. NICHOLS,
General Manager.

[F. R. Doc. 54-6921; Filed, Sept. 2, 1954; 8:45 a. m.]

Representative DURHAM. Any more questions on the licensing provisions?

Representative HOLIFIELD. On the first paragraph on page 4, I noticed you are having industry conferences, and that you assure us that these conferences will not be a substitute for an opportunity of giving the public issuances of notice of proposed rule making to comment on any AEC regulations before they are actually placed in effect.

My only question there is, Will there be adequate time given for a review of these regulations which you have agreed to with industry for our staff to look over before they become effective, and also for the public to look over before they become effective, and if this is just a gesture or if real substantial comment was given to you would you pay any attention to it?

Mr. MITCHELL. Certainly, on the first part of your question, Mr. Holifield; this contemplates that we will publish proposed regulations in the Federal Register, and allow a period of at least 30 days for interested parties to write in or come and see us, if they like. Certainly, if they make any suggestions, we will consider them very carefully.

Representative HOLIFIELD. So you will publish proposed regulations. You will not wait until they are finalized.

Mr. MITCHELL. No, sir.

Representative HOLIFIELD. That is all I have.

Representative DURHAM. The next subject, I believe, is the pricing schedule.

Mr. STRAUSS. The General Manager, Mr. Nichols, will present that subject, Mr. Chairman.

Mr. NICHOLS. Mr. Chairman, on January 5, 1955, the Commission approved the schedules of base prices and charges for certain mate-

rials acquired, sold, or leased by the AEC. These schedules contain classified information and hence are made available only to properly cleared persons.

The schedules include the basic charges which domestic licencees under the act must pay AEC for natural uranium, thorium, heavy water, U–235, U–233, or plutonium as used in nuclear reactors and other peacetime applications of atomic energy. The last three items, U–235, U–233, and plutonium, may only be leased to licensees. The other materials may be either sold or leased.

The schedules also established fair prices that AEC will pay for special nuclear materials produced in privately operated American reactors.

The schedule of prices to be paid by AEC is based on the following considerations:

1. The planned expenditures for weapons materials will not be increased for the benefit of nuclear power.

2. AEC will acquire special nuclear materials from licensees for subsequent distribution to other licensees and for other potential uses. The price structure gives effect to a consideration of value of these materials for intended use by the United States.

3. Prices for fuel grades of plutonium and U–233 will be based on their value as nuclear fuels, competitive with U–235, in a power-reactor economy.

4. Prices paid by AEC are subject to adjustment for the full cost of separations, recovery, etc., if the materials are in a form other than indicated in the price schedules.

5. The prices stated in the schedules are subject to adjustment for deviations from the specifications on which they are based.

6. Prices to be paid by AEC for special nuclear materials produced by licensees will be guaranteed for a period of 7 years, except for periodic adjustments if there are substantial changes in the Bureau of Labor Statistics Wholesale Prices Index, excluding farm products and processed foods.

The schedule of charges to be made by AEC for sale or lease of material and for services is based on the following:

1. AEC will make special nuclear material for fuel available to facilities licensees for the period of the licenses.

2. AEC will lease or sell other reactor materials (which are not available commercially) under contracts or leases which may be for the full period of a license, subject to periodic adjustment based on the BLS index noted above. AEC will lease or sell these materials and sell services only within the capacity of its presently authorized plants or additional capacity which can be made available without significant additional capital expenditures.

3. Plutonium and U–233 will be leased at values expressed in the pricing schedules only to the extent the AEC has acquired such materials at those prices.

4. The basic lease or use charges for special nuclear materials, source materials, and other reactor materials, which are leased by AEC will be computed at 4 percent per year of the established value of the material.

5. Licensees will be charged at prices indicated in the schedules for special nuclear materials consumed or lost.

6. It is intended that the responsibilities for fuel element fabrication and chemical recovery of spent fuel elements and fabrication, refining or processing operations as they relate to the operation of private nuclear reactors will be assumed by the operators. AEC will continue to do this kind of work until it can be assumed by industry. AEC charges for such work will be estimated separately for each job on the basis of recovery of full costs.

We propose to give you tomorrow additional data on a classified basis at the executive session, because these prices still are classified and even higher classification is the basis for some of them, if you want to go into great detail as to how we get into a particular price.

Chairman ANDERSON. As I said, we expect to take that up tomorrow, and we did expect that those questions would come in.

There are some general questions. Does the Commission's assumptions that the planned expenditure for weapons materials will not be increased for the benefit of nuclear power mean that additional weapon grade material has no value as an addition to our stockpile of weapon material?

Stated another way, does this assumption mean that the United States is willing to pay X dollars for the fissionable materials which will go into weapons now scheduled for production, but the military place no value on the additional quantity of material which would permit the manufacture of more weapons than are now scheduled for production?

Mr. NICHOLS. I think I have to give you the complete answer to that in a classified session. I regret it. It is based on the requirements that have been given to us.

Chairman ANDERSON. I accept the answer. It is probably the only one you can give. But we thought it would not require a classified answer.

Does the Commission's pricing schedule assume that the time will not come in the next 7 years when it might be more advantageous to the United States to shut down its oldest and more absolute special nuclear material production plants and rely instead on production material by industrial plants?

Mr. NICHOLS. In this price structure some plants might be shut down—some of the inefficient ones.

Chairman ANDERSON. Is the schedule of prices established by the Atomic Energy Commission for the next 7 years a schedule of guaranteed prices or is it rated by the Commission as a schedule of absolute prices that must be paid? In other words, does the Commission foresee any possibility that it might be willing to pay more for certain materials under foreseeable circumstances than the price established in the price schedule?

Mr. NICHOLS. We have put in the price schedule certain incentives for weapon grade material during the 7 years. We have another price structure for what is the long range value for fuel. So we are giving some benefit to the idea that some of this material will be used in weapons, but we have tried to avoid building in a subsidy in the pricing structure. We have tried to build this pricing structure, particularly the long time part of it, essentially around what is the estimated value of the material in the future.

Representative HOLIFIELD. Is that computed on a fuel basis or a weapon basis?

Mr. NICHOLS. On a fuel basis. The other values for fuel basis are based on the relative value of plutonium 235 in a power reactor as compared to U–235 in that power reactor. The 235 we base on what we anticipate the cost of production, plutonium for fuel we base on what is the relative worth compared to U–235.

Representative HOLIFIELD. These guaranteed prices are actually a floor, are they not?

Mr. NICHOLS. They are minimum prices.

Representative HOLIFIELD. If the United States needed additional material they could offer premiums to get it?

Mr. NICHOLS. Yes, sir.

Representative HOLIFIELD. I assume that you would not offer premiums unless it was for weapon purposes.

Mr. NICHOLS. Then we must treat all licensees the same under the law. We have to watch what we set here because it applies across the board.

Representative HOLIFIELD. That is true. Did you answer the question, that premiums above the floor price would only ordinarily be offered if it was to be used for weapon purposes?

Mr. NICHOLS. The premium above fuel prices for plutonium and U–235 for 7 years are based on possible fitting into the weapons program. That is higher than the fuel value.

Representative DURHAM. You can determine this price on each individual operation under this bill, can you not?

Mr. NICHOLS. I don't believe so, sir.

Representative HOLIFIELD. You do not think so?

Mr. NICHOLS. Not under a license. We could under contract, but if we do it under license, we have to have a universal basis of treating all comers the same.

Representative HOLIFIELD. I think that is one of the reasons why the 7-year program might be very well retained because the time will come when by efficiency these prices should be dropped, and the Government should not be required to pay the prices it is paying now.

Mr. NICHOLS. We have been accused of setting them too low by some of the people that were optimistic about the prices. We tried to set them where they would be durable. They would go on through. As I stated before, this is not a place where we are trying to put in a hidden subsidy for developing power. If a subsidy is required, we will probably put it in another way.

Chairman ANDERSON. We will probably go into that question of prices in executive session.

You could theoretically set the prices too low for another purpose, too.

Mr. NICHOLS. Yes, sir.

Chairman ANDERSON. You could set the price too low in order to discourage the production of electrical current by atomic energy.

Mr. NICHOLS. That is right. We have been criticized on both sides by people worrying about the money going out. They say the selling prices are too low and the buying price is too high. I have a little hope in that that may be we are close to being right.

Representative DURHAM. General Nichols, would you hazard a guess when you are going to issue the first license under the procedure which you outlined to us? What worries me is the time element here.

Mr. NICHOLS. We anticipate on the pricing schedules—we felt this was really the first step that fits in with the power demonstration reactor—that nobody is ready to license under 103. If there were, we should be reporting it to Congress, and indicating it is so. We do feel that perhaps we are close enough to where someone may build a research and development reactor. We felt for them to appraise the possibility of are they ready now in private industry to put money in this type of work on an experimental basis.

The first thing they would have to have is prices. In other words, what will we pay for material produced, and what will we charge for services and material rendered. That is like saying to a man who is going to produce power, what is the price of coal. This is the first step.

We would hope that if our program of calling for offers by April 1 gets several good ones, we could pick out 1 or 2 that really advance the art, and warrant going ahead, and that would be a type of license. It would be a research and development basis, and not on the basis of 103. It would be under section 104.

Representative HOLIFIELD. On page 3, item 4, I notice that you have set up the charge for leasing on a 25-year basis of the value of the material. I presume that would mean the primary loading of a reactor; would it not? You would set a value on the material that was necessary for the primary loading of a reactor and charge 4 percent on that?

Mr. NICHOLS. Yes, sir.

Representative HOLIFIELD. Then any replacement or maintenance that was necessary, or cleaning of the fuel, would come under a change of special services.

Mr. NICHOLS. Yes; I would like to give an example of that. Say a reactor requires so many kilograms of uranium 235. In our pricing structure we have set a value of so much per gram, which is classified. That is so many millions or hundreds of thousands of dollars worth of material it takes in inventory to keep that reactor running. We would charge on that value 4 percent per year.

In addition, we would charge them for all the material burned up. In addition, we would charge them for what is the cost to convert it back to the material when they return it to us, and the recovery of the plutonium or U–233. Those are additional charges.

This is brought in here because we cannot sell the material to them and yet that is a big part of the capital investment in a reactor, that is, the fuel investment. So we felt the fair thing to do was to charge interest and 4 percent was what we established.

Representative HOLIFIELD. Assuming that you come to an equitable determination of the value of the material, I would say it seems to me this is a very good way to handle it.

Mr. NICHOLS. We debated whether it should be 2½ percent or 4½, as used by some Government agencies, and some people say they can borrow at 3½, but after discussion decided on 4.

Representative HOLIFIELD. This is based on 25-year amortization. You might say it is equivalent to amortization on a 25-year basis at 4 percent. I think that is normal commercial amortization in most instances. Some instances it goes a little longer than that.

Mr. NICHOLS. This has generally not been subject to too much criticism, so I think we are coming close to what is logical.

Chairman ANDERSON. Do the prices include only the cost of production of material with no allowance for fuel fabrication or fuel processing?

Mr. NICHOLS. No, sir. When we furnish a fuel rod for a reactor, the idea would be that there is a base charge in the case of U-235 which goes into the material. Then there is the work for the form they desire; if we do it, we would charge it on a cost basis. Ultimately I hope that you would have firms and industries that would pick up that load and do this on a commercial basis, where we would license them to take material from us and supply it to some power industry or chemical concern that is using a reactor or whatever licensee is using it for, where they would charge them for fabricating the material to put it in the form they want it.

Chairman ANDERSON. Does the Commission's announced program for expansion for its feed-materials system act as a discouragement to potential private investors to the feed material of atomic energy?

Mr. NICHOLS. When you were absent we discussed that with Mr. Price. The basic argument there that we use the old method of doing it by Government appropriation and Government contract was the degree of changes in specification at the present time, and the urgency of the situation. Otherwise we would have considered doing this by a license with private enterprise.

Chairman ANDERSON. Mr. Cole?

Representative COLE. Yes; I have a couple of questions.

First, is it possible for you to discuss in open session as to the reasons why the pricing schedule must be classified?

Mr. NICHOLS. Yes; I believe it is. There is a possibility of correlating production if we were to announce what are the prices of all materials. In other words, people know what our appropriations are. They know what has gone into operations. They know what has gone into construction of plants. They could come closer to estimating our production if they knew the value of these prices, particularly where we are giving a cost.

We feel we have compromised here the problem of security with how do you get on with the work. Many of these prices were top secret last year. But we felt you could not possibly encourage private industry and keep them top secret. People have to have them to use them.

Representative COLE. It is understandable that the actual costs of the special nuclear materials to the Government are highly classified and should remain so. But the price schedules that you are going to offer to the public have no relationship whatever to the actual cost to the Government of producing those same materials.

Mr. NICHOLS. It does in some cases.

Representative COLE. There is nothing in the law that requires that; is there? In other words, that these materials you have just enumerated on the price schedule shall represent the Government cost?

Mr. NICHOLS. No; but the relationship to them and the justification. As I say, the justification is more classified than the actual prices. We felt we were taking quite a step in going from a very high degree of classification to confidential.

Representative COLE. I think the committee had in mind when it wrote into the law that the price schedule to be fixed by the Government for these materials need not necessarily reflect the Government's cost of those same materials was for the purpose of making available as public information what those price schedules should be.

If it had not been for the fact that just now some of those particular items had been identified nobody would have known which one——

Mr. NICHOLS. As I say, we cannot discuss all the tie-ins here as to which ones are closely related. We feel that this is the first step. Ultimately we may find it desirable to declassify them completely.

Representative COLE. I recognize that this is a touchy subject, and that is why I raised the question initially as to whether the question of publishing these price schedules could be discussed in open session. You indicated that it could be. Now I see that it cannot be and perhaps already some damage has been done.

Mr. NICHOLS. No, sir; I don't feel there has been damage done. To explain it in detail, you do need an executive session. I think we can state these general principles.

Representative COLE. Enough for the moment on that subject. In the first part of your statement, referring to the prices to be paid for use of special nuclear material, in the second paragraph, you say that the last three items, 235, 233, and plutonium, may only be leased to licensees.

Perhaps that was an inadvertent use of the word "lease," but I call to your attention that there is no authority in the law for the Commission to lease those materials. I realize that it is perhaps premature.

Mr. NICHOLS. Can we refer to counsel?

Representative COLE. I raise the question now only to emphasize the intention of the act that people using the special nuclear materials would not be governed by contractual relationships with the Commission, but would operate as licensees rather than as lessees.

Mr. MITCHELL. I think, Mr. Cole, it might have been more apt if we said "may only be licensed"; that is, of course, what the act provides.

Representative COLE. That is right. At least for the moment you agree to a minor revision of the statement, or clarification.

Mr. MITCHELL. Clarification, I think.

Mr. NICHOLS. We were using the term "lease" because we planned to pay interest.

Representative COLE. Surely licensees will have to pay for the use, but that does not necessarily make them a lessee.

Mr. NICHOLS. "Obtain" would probably be better.

Representative DURHAM. Do you not operate on a lease basis at the present time in the reactors you have existing?

Mr. MITCHELL. As to special nuclear material, no, sir.

Representative Durham. How do you operate, may I ask? Is that off the record, too?

Mr. MITCHELL. Yes, sir.

Representative DURHAM. I will not follow through.

Senator JACKSON. Mr. Chairman, I had 2 or 3 questions that are out of order. I was not able to be here when my turn came for the questioning.

In connection with the study program, has anyone been turned down?

Mr. STRAUSS. I don't believe anyone has.

Mr. NICHOLS. Yes, I believe there has been one, very early, before my time. It was in South Carolina.

Senator JACKSON. Without mentioning the name of the firm?

Mr. NICHOLS. It was a private power company that applied some time ago, before my time as General Manager, that was turned down, I understand, because they did not indicate that they were going about it aggressively enough to warrant a study contract. I don't know of any others. That was deferred. It was not turned down. They never came back. Mr. Davis corrects me on that.

Senator JACKSON. Have any firms been discouraged from going into the study program?

Mr. NICHOLS. Not that I know of, sir. We occasionally have invited firms to get together in a group to cut down on the amount of our administrative work in dealing with them.

Senator JACKSON. Have you had any complaints on this April 1 deadline?

Mr. NICHOLS. I have had one from the rural electrification group, Public Power, in writing, and I have had one from——

Senator JACKSON. How much time did they ask for?

Mr. NICHOLS. I don't believe they said how much time they wanted. They just felt it was too early for them to really get into the problem.

I have had one other utility group indicate to me that it appeared to them that the time was pretty tight. I said to indicate to us whether another month would do some good. He said, "I don't know yet. Maybe we can make it." We are interested in knowing if one month would do a lot of good, we might consider postponing this. But if it is going to take a year, then we would prefer to go ahead and see if we get proposals. Whenever you set a time, of course, you run up against the problem of have you allowed enough time.

Senator JACKSON. General, do you not think that if there is a sufficient showing that the applicant is sincerely interested in getting into the program that the Commission should exercise its discretion rather liberally in trying to accommodate them?

Mr. NICHOLS. We will cover it later when we get to this chapter, but we have the desire to go on with the work. There are some of these reactors that may be at a stage where private industry will pick up a greater portion, or public power for that matter, for the responsibility of development. If that is true, and we do get a reasonable number of proposals, there is the desire to get on with the work here and set an early date.

We also felt we needed a reasonably early date because we may find none of the people may be able to come up with a proposal because of something like the hazard condition. In that case, we would like to have it in enough time in order to come to Congress and perhaps get remedial legislation during this session.

Another consideration on time is that we have in the budget—I believe it is $75 million—for this item covering the acceleration of programs. I had great difficulty, for example, convincing the Bureau of the Budget that there was anything to this; in other words, will you get proposals or won't you. I am talking about the staff. Mr. Strauss convinced Mr. Hughes this is the type of thing you just have to put the money in the budget and see what the response is. The

same way when we go before an appropriations committee and this committee in justifying this. We would hope to have some of these proposals where we could discuss specific ideas of what we are going to do with the money, rather than just the nebulous idea that I am explaining today, that we have hopes. We would like to know what type of proposals are we getting, how worthwhile is this procedure.

Of course the early date tends to mitigate against the people that are getting into the program later. But we feel for the benefit of those if this procedure works where we can extend a dollar of Government money into three as a result of private or other contribution, we would repeat this in 6 months or a year. There would be no freezing out because somebody misses this particular first go-round and that is the end of the business.

Senator JACKSON. Your objective, and I am sure you agree with me, obviously should be to encourage as great a number of firms to participate in the undertaking that you can possibly do under the circumstances. I assume that is your objective.

Mr. NICHOLS. That is our objective.

Senator JACKSON. I take it that you will liberally exercise your discretion in such a manner as to try to achieve that objective?

Mr. NICHOLS. We may achieve it. If we find too many people have been left out, but at the same time we find we have some very worthwhile programs that should come forward, we may save some of the money that will be appropriated by this Congress where we would set another date like October or November of this same year.

Senator JACKSON. Let me ask you on the licenses, have any licenses been granted?

Mr. NICHOLS. For possession of U–235, the only one that has been granted has been to the DOD.

Mr. MITCHELL. We also in addition to one arrangement with the Department of Defense have treated as licenses certain permits that the Division of Research has issued for gram quantities of special nuclear material for research purposes.

Senator JACKSON. The reason I ask the question is that I have read through this statement on licenses and no mention was made at all as to whether any licenses had been granted as yet.

Mr. MITCHELL. In effect, Senator, we have had to cover some specific situations in order not to hold up the program. But in each instance we have said when we do issue our regulations on licensing, then these will govern the particular situation.

Senator JACKSON. As of now no licenses have been issued under the 1954 act?

Mr. MITCHELL. Yes, sir, to this extent; that we have made one arrangement with the Department of Defense, which because of the provisions of the 1954 act, we had to consider that a license was necessary. So we issued in effect a letter of contract which we said this is your license and the provisions of the rules and regulations of the Commission and the provisions of the law will apply with the idea that later on when we issue our regulations across the board, these would come into being on this particular situation.

Senator JACKSON. Then the answer to my question very simply stated is "Yes," to the Department of Defense.

Mr. MITCHELL. And also, sir, in connection with these issuances by the Division of Research of gram quantities of special nuclear materials to programs that have been going on for sometime. When the new act came into being, we had to license the recipients of these, and we did this by a simple amendment to their existing contracts.

Senator JACKSON. Then in addition to the Department of Defense those associations or firms that have been operating under the contract provisions of the act or old law were taken in by amendment to their contract to be in effect granted a license under the 1954 act?

Mr. MITCHELL. That is right, sir.

Senator JACKSON. But other than the people that were currently covered, the only license in the form of a new undertaking is in the Department of Defense.

Mr. MITCHELL. In the one instance.

Senator JACKSON. In the one instance to the Department of Defense.

Mr. MITCHELL. That is right.

Senator JACKSON. So to sum it all up, you really have had no experience at all in the licensing field to make an evaluation at this time?

Mr. MITCHELL. That is right.

Senator JACKSON. What you are testifying to today is to your projected plans when the applications are ready for action.

Mr. MITCHELL. What we are doing, Senator, is that we have been working for over 6 months on our proposed regulations and what we are planning to do is to first call in industry advisory committees, and then publish proposed regulations in the Federal Register, and invite comment, and then finally settle on the final regulations.

Senator JACKSON. How many firms or individuals have applied for licenses under the act?

Mr. NICHOLS. You mean for use of fissionable material?

Senator JACKSON. For all purposes?

(No response.)

Senator JACKSON. What I am trying to find out is this: I do not want to waste the time of the committee. I want to find out whether this act is working. I think it is important that the public know.

Mr. NICHOLS. I think the whole licensing procedure is still in the future. We are working on trying to get the procedures up to the Commission. As it was stated in the paper, the legal counsel and Mr. Price, who is working on licensing in particular, have brought 2 or 3 papers to the point where they are being studied by the Commission. The next step is to hold heairngs with interested parties to get their adivce. We would hope to complete this job some time this spring. But it has been a long tedious job and a most difficult one. But licensing is really in the future.

Senator JACKSON. General, what you are now saying is that you are working on the rules and regulations.

Mr. NICHOLS. That is right, sir.

Senator JACKSON. What I am trying to find out is whether even in the absence of any rules or regulations and procedures that you contemplate promulgating in connection with your power under the Atomic Energy Act, you have had any indication in writing, verbal, or otherwise, from firms that anticipate applying for licenses, or a license.

Mr. NICHOLS. We have had indications that there are certain firms that will apply for a license under section 104 for research reactors.

We also know, or I, at least, know, of three different outfits that want to build a research reactor and they have indicated that to us. But they are going ahead with their plans trying to find out how you finance it. In some cases we have the Reactor Safeguard Committee investigating the reactor. It is not a dead loss in time.

Senator JACKSON. The fact that the rules and regulations have not been, as yet, promulgated by the Commission, do you feel it is holding up the applicants? Are the applicants standing by waiting for you folks to get the rules and regulations in effect?

Mr. NICHOLS. No, sir; I don't believe they are. They are proceeding with their own evaluations, many of them under study contracts or access agreements. In other cases, they are already by a procedure of study access one with another investigating with certain concerns as to the design of reactors, the price of reactors, the type you recommend for this particular purpose. I know of certain companies that are all ready now to go in the business of selling research reactors. There are other people that are interested in buying them. They can go ahead with many of their problems. They can locate the site. They can check with us what will the Reactor Safeguard Committee say about where they plan to put it. In some cases these companies are going to organize groups of companies to finance and operate a reactor. They can do that on the basis of information they now have. The pricing structure was a great help.

Senator JACKSON. Do you think it is a bad sign or do you infer anything from the fact that there have been no formal indications of applications for licenses?

Mr. NICHOLS. We have some requests indicating they will want a license for a particular purpose.

Senator JACKSON. You see what I am trying to get at in my line of questioning. I am not trying to trap anybody.

Mr. NICHOLS. I am encouraged by the interest that has been shown.

Senator JACKSON. There is nothing that you folks are doing or failing to do that is in anywise responsible for the possible delay in these firms in applying for a license?

Mr. NICHOLS. I don't believe so.

Senator JACKSON. It is a technological problem. In other words, the firms don't have enough information as yet which would warrant them to apply for a license.

Mr. NICHOLS. What they are doing is waiting for the rules. But they are dealing with us informally and going ahead. I don't feel any time has been lost to date. I would state that I thought licensing would be a lot more simple to formulate than it has turned out to be. We have one member, in fact the Deputy General Counsel, who was given the sole assignment of expediting these with the various task forces within the Commission, but to correlate them and try to make them fair. It has turned out to be a very difficult job.

Senator JACKSON. Is there anything that can be done to expedite any phase of this matter, either the job you have of promulgating the regulations or to spur private enterprise on so that they will move a little faster?

Mr. NICHOLS. Actually, we feel this pricing structure has been one of the incentives that will permit them to make their calculations. That took considerable time to get out.

Senator JACKSON. It disturbs me a little bit that some of these firms who had a lot of the advance know-how might not want to get going and be the first in to get their undertaking under way as soon as possible.

Mr. NICHOLS. I don't believe that is correct. Some of the early firms that got in on reactor design studies are now very busy going around to potential users and telling them, "We can furnish you a service of designing a particular reactor or particular type of research." I am quite surprised at the volume of activity in this regard. What I am talking about is research reactors.

Senator JACKSON. When will you be set up and ready to make available the rules and regulations under which an applicant may apply for a license?

Mr. NICHOLS. Our schedules call for the papers to be completed and before the Commission some time in March. That is the draft of the task force. Then we need the convening of the special groups that we are calling in to give comments on them. Then the Commission will take formal action. The Commissioners are aware of these problems now, and they are studying the forms of licensing. After the Commission passes on it, then it goes up for a 30-day public announcement. I assume the Joint Congressional Committee will be interested in some of the provisions of these licenses.

What we are doing is setting off a whole new industry. We feel that if we make some basic fundamental errors in the beginning, we will be in serious trouble. So we are trying to do a good job on getting out the licensing procedure which is not too encumbered with redtape and yet protects and carries out the will of Congress which the 1954 act called for.

Senator JACKSON. Mr. Chairman, I am sure it need not be said that top priority ought to be given to the promulgation of these rules and regulations in connection with licenses.

Mr. NICHOLS. I would say we are doing that, sir. But I would not say I am satisfied with the progress made to date. It is just one of those jobs you can't do fast enough.

Senator JACKSON. I just hope there will be no delay so that we can certainly make it possible for anyone in private industry who is ready to go to be able to get the rules and regulations and apply for the license. I am sure you are keenly aware of that.

I do think that is very important. I am sure that someone is going to come along and say we are all ready to go, but we are waiting for the regulations. It may take much longer to get the regulations out than it will have taken to pass the act under which the regulations are issued. Is that a possibility?

Mr. NICHOLS. I hope not, sir.

Senator JACKSON. The law was passed when?

Mr. NICHOLS. The law was passed in August; August 30 of this last year.

Senator JACKSON. You are crowding it. It is about 6 months already.

Mr. NICHOLS. I believe the Congress started hearings prior to the last session on the new act.

Senator JACKSON. Most of the hearings, I think, were in 1954.

Mr. NICHOLS. Some were in the fall of the previous year, I believe.

Senator JACKSON. I am sure you will do everything you can.

Mr. NICHOLS. We will.

Senator JACKSON. If you need additional personnel or whatever you need, every effort should be made to expedite action on those rules and regulations. You can explore this thing from now until doomsday, and you still will not have reached the point where your rules can be freed from future amendments. I would like to suggest that there will be a lot of trial and error in it. The way to do is to start out and issue regulations subject always—and you have that right—to amendments to the license. You can reserve that right. But get it started. Do not let the perfectionists take over so that there will be rewriting and redrafting of these regulations for another year.

Mr. NICHOLS. They are coming out the spout now.

Senator JACKSON. The whole thing is a matter of trial and error, and the only way you are going to find out whether your regulations mean anything is to license someone, get them started, and see how many complaints you get from them.

Mr. NICHOLS. I agree with you on that.

Senator JACKSON. That is all.

Chairman ANDERSON. Senator Pastore.

Senator PASTORE. Along that same line, Mr. Nichols, would you want to venture a guess as to how many proposals you will have by April 1?

Mr. NICHOLS. I have hopes we will get four, at least.

Senator PASTORE. Four?

Mr. NICHOLS. At least, four good ones. We may get many more. We were surprised when we offered a similar thing of quite a different concept where we got the Duquesne Power & Light Co. We were greatly surprised from the response we got. People we never heard of before got into this thing, and hired people to give them advice, and went ahead and made a proposal.

Senator PASTORE. Would you characterize that as an encouraging result?

Mr. NICHOLS. If we got four good ones, I would say that is encouraging. If I could achieve here or the Commission could achieve the idea, like in the Duquesne reactor, where we put up three-eighths of the money over 5 years' experimental program——

Chairman ANDERSON. How much?

Mr. NICHOLS. Five-eighths.

Chairman ANDERSON. You said three-eighths, did you not?

Mr. NICHOLS. Private industry put up three-eighths and the Government put up five-eighths. I would like to reverse that percentage, at least, to where we get two-thirds or three-quarters of the money put up by private industry, and our dollars are multiplied by 2 or 3. I feel if we can achieve this, and get more people working on this problem, we will advance more rapidly.

Chairman ANDERSON. In the Duquesne deal, did you take, or if you take into consideration rapid amortization, which is going to cost the Government several million dollars, the Government is putting up a good share.

Mr. NICHOLS. That was not part of our transaction.

Senator PASTORE. At the time of this whole program which was being characterized—and I must admit by some very good people—

as a gigantic giveaway program, I ventured to say that I did not anticipate a stampede. Has there been a stampede?

Mr. NICHOLS. I don't think you can expect a stampede in this. I would hope we would have enough interest where we could make faster progress. What we are trying to do in all of these things is how we can move faster to the objective of economic power. I don't think there is going to be any stampede because it is not ready for that.

Senator PASTORE. I am not being critical in making that statement. The thing that I think ought to be explained to the public generally is the fact that there are not going to be too many participants in this program at best. It is a very expensive program.

Mr. NICHOLS. That is right.

Senator PASTORE. And you have to proceed very cautiously because there is so much involved.

Mr. NICHOLS. I think another thing that should be emphasized is that regardless of who or how we get economic power developed, it will be available to everybody. In other words, we really have to lick the technical problems of how we cut costs to where we have economic industrial power, rather than just power.

Senator PASTORE. May I come to another point. I do not know whether I should discuss this at this juncture. But a combination of utilities in the New England area of the country got together and formulated a company which I think is a drive in the right direction—It is called the Yankee—what is it called?

Mr. NICHOLS. Yankee Atomic Electric.

Senator PASTORE. Do you not feel, Mr. Nichols, that very much of the good results of this whole program depends entirely upon a partnership or a combination of a multitude of these people who are interested in putting forth their resources?

Mr. NICHOLS. Yes, sir. I think atomic power tends to adapt itself to that type of enterprise. It looks in many ways as though large reactors will be more economical than small reactors. Any one of the power companies in New England would have difficulty financing or absorbing all of the power from even a research reactor at this time. So by getting together—I don't know how they are in the New England group—by getting together as a group they all learn. We don't expect it to lower the power costs up there. But at least they are all in the business, and will form a generating company that will go into this business of seeing what they can do to develop power. That is one of the groups I would hope would come through with a proposal.

Senator PASTORE. Let me ask you this further question. Will the Government itself through the AEC invest any money in their speculation or venture?

Mr. NICHOLS. What we cover in the later paper, the demonstration reactor, is that we hope they would essentially finance the structures, and if they want a competitive proposal we might consider waiving such things as the interest rate on the material for the research and development period. We would consider doing certain research and development work for them.

We also might consider actually making a research and development grant to them with the idea that we would get their results and make it available to all.

Senator PASTORE. When do you feel we will be in a good position to make a proper appraisal of whether or not this 1954 law is working well?

Mr. NICHOLS. One of the first indications would be if we got several proposals under this April 1 date, under the demonstration power reactor program.

Senator PASTORE. Would you say that now is not exactly the time?

Mr. NICHOLS. Now is too early. People have been studying it. I would say the results are promising, but they are too early yet to indicate just what we will get. I would say it is promising from the small research and development point of view as to the number of people that are finding ways and means of getting into the business, and are interested in building research reactors. All that will broaden the base. I am sure if you follow any research project as you broaden the base and get more minds to work, you will get better results.

I think the Atomic Energy Act of 1954 was a big step in opening this thing up.

Representative DURHAM. You have nothing that stands in the way of granting licenses for experimental and research reactors at the present time. The pattern has been set.

Mr. NICHOLS. We can do it on that basis.

Representative DURHAM. You do not have any experimental or research reactor in the country sitting around that needs fission material?

Mr. NICHOLS. No, sir. We can find a way any time it is ready to go ahead. That is one of the arguments for expanding the study and access group. Pending the more complete use of licenses, we can find a way to do it. It is just like the DOD reactor. I am certain we are not going to hold up anybody that is ready to go.

Representative DURHAM. All of the rules and regulations fit more or less into the rules and regulations that you have carried on your experimental research reactors. I don't see the difference. One is larger than the other. They use the same material. It carries a good deal of the structural secrecy that you have on the experimental reactors. It looks to me that it would not be such a difficult job to promulgate rules and regulations. I don't see why you should get them so complicated. I am afraid you will get them so complicated you will discourage them.

Mr. NICHOLS. We are trying to keep them simple, sir.

Representative COLE. General Nichols, on the number of people expressing interest in moving forward, are you able to comment to what extent, if at all, the provision of the law relating to the patents has tended to discourage people from making application?

Mr. NICHOLS. In the utility field they don't worry too much about patents, sir. Counsel can confirm this. It is my impression that they try to get everything open so everybody can use it. That is their general practice. They feel you can develop a better powerplant if you let everybody use it. In the utility field I don't think they are trying to protect themselves with patents. In the chemical field where people feel this may be of some value in chemical research or processing, there you run into a group of people that are more interested in the patents. Several of them have expressed a little worry to me as to how we get something where we can really do as we have

done in the past. If we really discover something is ours, for example. Nobody has protested violently, have they?

Mr. MITCHELL. I don't know of any.

Representative COLE. Is it improper for me to ask if it is not a fact that one of the chemical companies dropped off a study group for the reason they were not offered any future that would justify the particular company to expend its money in research?

Mr. NICHOLS. I am not sure which one you speak of.

Representative COLE. I am not going to identify it. I am just asking the question whether it is proper to raise the question.

Mr. NICHOLS. I think there is one that dropped out, but it was for probably a different reason.

Chairman ANDERSON. If we could identify the company, we could find out what the reason was.

Representative HOLIFIELD. We could write them a letter.

Representative COLE. At any rate, you have not observed that the patent phases of the act have tended to discourage potential applicants.

Mr. NICHOLS. I would say not yet, sir, although I have heard some informal comments that they wished they were more liberal.

Mr. MITCHELL. I think we need more experience with the new law before we can tell definitely. We are trying to decide what section 152 means, and how we are going to have to apply it.

Chairman ANDERSON. You want to pass to the reactor section now?

Mr. STRAUSS. As you will, sir.

Mr. Chairman, I have some interesting information about the Atomic Industrial Forum which it might be appropriate to offer in view of Senator Gore's interest in it.

I find that it has 20 directors, Senator Gore, including a number of presidents of companies, one former Chairman of the Atomic Energy Commission, a former member of the Commission.

Chairman ANDERSON. Read the names into the record, if you wish.

Mr. STRAUSS. I was identifying them, sir.

Arthur H. Bunker, president of Climax-Molybdenum Co.
Walter L. Cisler, president of the Detroit Edison Co.
John L. Collyer, chairman of the board of the B. F. Goodrich Co.
Leonard W. Cronkite, president of the Atomic Instrument Co.
Gordon Dean, of Lehman Bros.
Dr. T. Keith Glennan, president of Case Institute of Technology.
Dr. Frederick L. Hovde, president of Purdue University.
Alfred Iddles, president of the Babcock & Wilcox Co.
Joseph A. Martino, president of National Lead Co.
John R. Menke, president of Nuclear Development Associates, Inc.
Francis K. McCune, general manager of Atomic Products Division of General Electric Co.
Adm. Earle W. Mills, president of Foster Wheeler Corp.
Alexander C. Monteith, vice president of engineering of Westinghouse Electric Corp.
Frank Pace, Jr., executive vice president of General Dynamics Corp., and formerly Secretary of the Army.
Dr. Mark E. Putnam, executive vice president of the Dow Chemical Co.
Ross W. Thomas, vice president of Phillips Petroleum Co.
Howard G. Vesper, vice president of Standard Oil Co. of California.
J. Carlton War, president of Vitro Corporation of America
J. B. Woodward, Jr., chairman of the Newport News Shipbuilding & Dry Dock Co.
John Perry Yates, senior vice president of Bechtel Corporation.

This same document indicates that as of September 15 there were 168 members, of which number just a little over 10 percent were

utilities, 7 percent approximately were educational institutions, two were labor unions, the Brotherhood of Boilermakers, Iron Ship Builders and Helpers of America, and United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada, and one was a law firm of Mr. Volpe, former General Counsel of the Commission and now representing the State of Tennessee in the Dixon-Yates controversy.

Senator PASTORE. May I ask one question on that one subject? Is there any information that an individual could obtain from the forum they could not get from the Commission?

Mr. STRAUSS. No, sir, it is all unclassified. I beg your pardon.

Senator PASTORE. In other words, the question has been raised on impartiality and partiality. I mean this. If a person appealed to them for certain information and could not get it from them, could they get that information from the Commission itself?

Mr. STRAUSS. Since this is the depository for all the unclassified information, I would assume that unless there is some accident of omission that they would have all the unclassified information that the Commission issued.

Senator PASTORE. No, I mean an individual who is seeking information from the forum and could not get it from the forum, could they obtain it from you?

Mr. STRAUSS. Yes. I think the makeup of this organization indicates its generally fine quality .

Representative COLE. May I inquire, is it not a fact that this is the only association of institutions and business organizations and individuals which might be interested in the atomic field on a nonprofit basis?

Mr. STRAUSS. I believe there is an engineering organization recently formed, Mr. Cole, but I think as far as its scope is concerned, yes, sir.

Representative COLE. That is a nonprofit organization?

Mr. STRAUSS. That is my understanding.

Representative COLE. There is no reason, is there, that if that organization wants to apply for a position or status as a repository that it should not be considered?

Mr. STRAUSS. No, sir, none that I know of.

Representative COLE. My point is that in granting this status to the Atomic Forum, you did not exclude other qualified associations.

Mr. STRAUSS. No. There were three others that also have this opportunity that are depositories. Three other institutions.

Representative COLE. They are institutions of learning?

Mr. STRAUSS. Two of them are.

Dr. LIBBY. One is a technical library. The John Crerar Library is a technical library in the city of Chicago, and is used by everyone in the city. It is one of the finest technical libraries in the world.

Chairman ANDERSON. May we go to the reactor section, section V?

Mr. STRAUSS. Dr. Libby will have that part.

Dr. LIBBY. This is the so-called 5-year program, entitled "Present Status of AEC Power Reactor Technology Program."

The AEC's power technology program is based on the premise that it is the Government's responsibility to advance the frontiers of knowledge in the field of reactor development. It is expected that industrial organizations will gradually pick up the advanced tech-

nology of earlier periods and carry it into end products on a risk capital basis. As this transition occurs in reactor development, the Government's role is to push forward into still more advanced technology.

The AEC's power reactor technology program was presented to the Joint Committee in February 1954. This program is proceeding essentially on schedule and as outlined in the Report of the Subcommittee on Research and Development on the Five-Year Power Reactor Development Proposed by the Atomic Energy Commission issued in March 1954. It calls for five specific reactor development projects and advanced engineering development estimated to cost a total of approximately $200 million over the period from fiscal year 1954 through fiscal year 1958. There follows a review of the status of individual components of the program.

EXPERIMENTAL REACTORS; PRESSURIZED WATER REACTOR

As the first United States full-scale nuclear central station powerplant, the pressurized water reactor will provide reliable cost data relative to construction, operation, and maintenance of a large nuclear powerplant—a major technological advance.

In response to invitations by the Commission to utility and industrial groups to participate in this project, the proposal submitted by the Duquesne Light Co., of Pittsburgh, Pa., was the most favorable to the Government. Under its contract with the Commission, Duquesne will furnish a site for the entire project, will build and operate a new turbogenerator plant, will operate the reactor portion of the plant and will assume up to $5 million of the costs connected with development and construction of the reactor portion of the plant. Duquesne also will purchase at specified rates steam generated by the reactor.

The plant will be located on the Ohio River at Shippingport, Pa., about 25 miles from Pittsburgh, and in reasonably close proximity to populated areas. Initial ground breaking took place September 6, 1954.

An extensive development effort is being pursued to produce fuel element and reactor structural materials which can successfully resist the extreme operating conditions expected to be induced in the PWR by radiation, heat, and corrosion. Development contracts for new types of pumps and valves have been given to major industrial organizations.

The Westinghouse Electric Corp. is the Commission's principal contractor for the design, development, and construction of the reactor portion of the plant. The Stone & Webster Engineering Corp., under subcontract to Westinghouse, is performing architect-engineering services for this part of the plant.

Chairman ANDERSON. Would you know any reason why the rapid amortization business should be given on the defense basis. Is there anything in this reactor that would justify on a defense basis rapid amortization?

Mr. STRAUSS. Mr. Mitchell may have the answer. I do not know.

Mr. MITCHELL. We are not familiar on the basis that the application was made to the Treasury. We have been informed by the Treasury there had been an application. They asked for certain factual information and we provided it.

Chairman ANDERSON. Did they ask for your opinion as to whether this was in any way essential?

Mr. STRAUSS. This followed by some time the conclusion of the arrangement between the Commission and the contractor.

Chairman ANDERSON. I am familiar with the fact that it did. I am wondering what representations they made with the assistance of the Commission.

Mr. STRAUSS. Mr. Chairman, I think this is of sufficient importance not to give it offhand treatment. We should provide you with the facts, and we will undertake to ascertain them.

Chairman ANDERSON. Thank you.

(The information referred to follows:)

DECEMBER 16, 1954.

Subject; TA–28436, Duquesne Light Company.

Mr. NATHAN D. GOLDEN,
Director, Scientific, Motion Picture, and Photographic Products Division, Business and Defense Services Administration, Department of Commerce, Washington 25, D. C.

DEAR MR. GOLDEN: Reference is made to your memorandum of September 23, 1954, which referred this application to us for comments and recommendations.

Item 1 of the application makes the statement that, "the facilities are * * *, and buildings containing a turbine generator of approximately 100,000 kilowatt capacity together with all appurtenant and auxiliary facilities * * *." The statement is also made in Item 1 that, "The turbine generator plant will be so designed that additional generator capacity can be installed to the extent of a further 100,000-kilowatt capacity." In Item 3 of the application it is stated in part, "The purpose of the facilities which applicant seeks to be certified is set forth in Items 1 and 2. The maximum designed production of these facilities is 200,000 kilowatts."

It is desired to emphasize that the interest of the Commission is presently limited only to the generation of approximately 100,000 kw of electrical energy. Any plans for possible future expansion of site facilities above 100,000 kw capacity are of Duquesne Light Company origin. While it is not unreasonable that the company might, at this time, consider the requirements of possible future expansion, it is not clear whether or not the cost estimate of $14,000,500 as shown on page 1 of Appendix A, includes only costs for buildings, facilities, and equipment required for the generation of about 100,000 kw of electrical energy. Any costs in this estimate which reflect additional expense required by the possibility of future expansion beyond approximately 100,000 kw fall beyond the scope of Commission sponsorship.

Part (b) of Item 1 does not clearly define the uses to which the Duquesne Light Company contribution of $5,000,000 may be put. The definitive contract between the Commission and the company states in this respect, "In addition to its other undertakings under this contract, the company will furnish services, materials, equipment or facilities for the design, development, and construction of the nuclear portion of the plant in such form as the Commission may designate and at such times as are consistent with progress of the work; provided, however, that the total cost to the company under this subsection will not exceed $5,000,000." The contract also states, "Insofar as is legally permissible under the Atomic Energy Act, title to facilities and components furnished pursuant to this subsection will be retained by the Company, ———."

For safety aspects (i. e., proximity of population) existing facilities of the applicant could not be utilized and new construction to the extent of about 100,000 KW capability is required at the site described.

Expansion as described in the application up to about 100,000 KW capability is of interest and benefit to the AEC inasmuch as participation of the Duquesne Light Company in this project is expected to reduce the expenditures the Government would have had to make had it undertaken the entire expense of construction and operation over a five-year period.

Whether the facilities will be used beyond five years cannot be determined at this time. However, the lease which was executed at the same time as the contract between the Commission and Duquesne was signed, provides that subsequent to the termination or expiration of the contract, the Government shall

have the right to use the property for the purpose of research, development, and experimentation on reactors and reactor technologies in connection with the generation of electrical power.

The Pressurized Water Reactor and associated materials, equipment, and facilities for the nuclear portion of the plant will be provided by the AEC except insofar as the Duquesne $5,000,000 contribution may be used for these purposes. No financial incentives are provided by the Government in the applicant's contract with the AEC. The principal benefit to the company will arise from its favorable position to gain practical knowledge of reactor technology and of nuclear central station operating procedures.

The marking, "Official Use Only" signifies that the material does not contain information of a security nature. However, such data should be handled with the degree of discretion reserved for information such as privileged information or trade secrets. Personnel not having an established "need to know" should not be given access to the data nor should any public statements of any kind be made without the expressed approval of the AEC.

Therefore, to the degree consistent with the established policies of ODM, the AEC supports this application. If you believe that we can furnish any additional information in this matter, please do not hesitate to call on us. The attachment to your memorandum is returned herewith.

Very truly yours,

RALPH R. BOYER,
Chief, Contract Finance Branch, Division of Finance.

Attachment.

Form DPAP-2
(10-30-51)

UNITED STATES OF AMERICA
DEFENSE PRODUCTION ADMINISTRATION
OFFICE OF DEFENSE EXPANSION

BUDGET BUREAU NO. 99-R003.1
APPROVAL EXPIRES SEPTEMBER 30, 1953

APPLICATION FOR A NECESSITY CERTIFICATE PURSUANT TO PROVISIONS OF SEC. 124A (Amortization Deduction) OF INTERNAL REVENUE CODE

Total cost of facilities sought to be certified: $13,081,500

Date of application: September 9, 1954

TO: Defense Production Administration, New General Accounting Office Building, Washington 25, D. C.

FOR DPA USE ONLY

File No. TA- 28436

(Date Received) SEP 13 1954

Comm. S-TE 16E
Agric.
Int.
I.C.C.

INSTRUCTIONS — Submit three (3) signed copies of the application and six (6) copies of the Appendix A. When a question is inapplicable, this should be so stated on the form. *Additional sheets may be attached in answering any questions or in providing other supporting information. A separate set of forms is required for each plant location.*

Name and Address of Applicant (Street, City, Zone, State)

Duquesne Light Company
435 Sixth Avenue
Pittsburgh 19, Pennsylvania

SMALL BUSINESS

1. Briefly describe the facilities and identify the principal materials and services produced or to be produced with facilities, described in Appendix A, for which certification is sought. Do not use general designations such as "Aircraft Parts" or "Radar Parts". In the case of service facilities such as cafeterias, offices, or plant protection, list principal materials and services of the plant facility served. Indicate clearly the relationship to existing facilities.

See attached statement

2. Give reasons why the facilities for which certification is sought are necessary in the interest of National Defense. The applicant should apply carefully the criteria for determination of necessity and of portion attributable to defense purposes set forth in Sec. 600.2 of the regulation (Title 32A) governing the issuance of necessity certificates prescribed by the Administrator of the Defense Production Administration.

See attached statement

3. Maximum designed production (Express capacity data (Columns (c) and (e)) in time and production units most common to this industry. Specify in Column (b) the units used, e.g., barrels per day, long tons per year, etc., as applicable.)

List separately materials or services identified in Item 1 (a)	Units of measure (b)	Maximum designed production without facilities sought to be certified (c)	Average percentage of maximum designed production used in quarter preceding filing of application (d)	Maximum designed production with addition of facilities sought to be certified (e)
Electric Power	Kilowatt	See note below	See note below	See note below

Applicant presently has ample electric power facilities. The purpose of the facilities which applicant seeks to be certified is set forth in Items 1 and 2. The maximum designed production of these facilities is 200,000 kilowatts.

4. Estimate quantities of raw materials required in processing to finished products.

Not applicable

F. Employment

See note below

Shift	Employment and work hours without facilities sought to be certified (for pay period ending nearest 15th of month preceding filing of application)				Estimated employees and work hours with addition of facilities sought to be certified	
	Actual		Capacity			
	Total production workers	Total man hours per week	Total production workers	Total man hours per week	Total production workers	Total man hours per week
(a)	(b)	(c)	(d)	(e)	(f)	(g)
First						
Second						
Third						
Swing						

Applicant presently has employees in certain facilities for purposes other than those which applicant seeks to be certified to set forth in Items 1 and 2. The estimated additional production workers which will be required for these facilities are 50 for workers and 50 for which numbers each of which will work 40 hours per week.

6. Production of services began or will begin with the facilities sought to be certified on the following date: (On gradually expanding facilities, give schedule of output.)

Production will begin during the year 1957

7. If applicant owns or has available idle facilities which may serve same purpose as those for which certification is sought, give reasons for not using for such purpose.

None available

8. Can applicant subcontract for all or part of the materials or services produced or to be produced by the facilities sought to be certified? ☐ Yes ☐ No

If Yes, why doesn't applicant so subcontract? If No, why not?

Because the facilities constitute the first nuclear central power station, are of an experimental nature and will be operated with the primary objective of gaining information and operating practice, as very fully described in Item 1.

9. Output of facilities sought to be certified will be used for the following purposes:

a. For the following principal prime contracts with the United States Government:

None

Date of contract	Contracting Government Agency	Program symbol (2 digits) or other contract identification	Materials or services	Delivery date(s)	Amount (Dollars)
(a)	(b)	(c)	(d)	(e)	(f)

b. For the following subcontracts with U. S. Government prime contractors:

None

Date of contract	Materials or services	Supplied to (Give Name and Address of Firm)	Delivery date(s)	(e) Government Agency receiving end products or services (f) Prime contract identification	Amount (Dollars)
(a)	(b)	(c)	(d)		(g)
				(e)	
				(f)	
				(e)	
				(f)	
				(e)	
				(f)	
				(e)	
				(f)	

c. For the following classes or types of customers other than the United States or its prime contractors (Wherever possible, also indicate final product use and its relation to National Defense purposes.)

Regular consumers

10. Estimate percentage of the maximum designed production of the facilities sought to be certified which will be used for National Defense purposes. (Explain basis for estimate)

The entire designed production of the facilities sought to be certified will be used indirectly for National Defense purposes for reasons stated in Items 1 and 2.

11. Has applicant sought, or does he intend to seek, assistance from agencies of the Government as to financing the cost of the facilities for which certification is sought? ☐ Yes ☒ No

If Yes, give details.

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12. The following statements are made with respect to the land described in Appendix A:

a. Name and address of seller (or proposed seller) to applicant.

See attached statement

b. Applicant's relationship, financial or otherwise, with such seller.

None

c. Use of land before acquisition by applicant.

See attached statement

d. Estimated value of land after five (5) years.

It is impossible to estimate the value of land after five years.

e. Why does applicant choose purchase as method for obtaining use of land?

It was impossible to obtain the use of land by an other method.

13. The following statements are made with respect to those buildings described in Appendix A which have been or will be purchased. Not applicable

a. Name and address of person from whom buildings were or will purchased.

b. Applicant's relationship, financial or otherwise, with such seller.

c. Use of buildings before acquisition by applicant.

d. Increased usefulness for defense purposes resulting from acquisition.

e. Estimated value of buildings after five (5) years.

f. Why does applicant choose purchase as method for obtaining use of buildings?

14. The following statements are made with respect to all other facilities described in Appendix A which have been or are to be acquired second hand; or which have been or which are productive assets of a going concern (Give Appendix A number in each case): Not applicable

a. Name and addresses of sellers (or proposed sellers) to applicant.

b. Applicant's relationship, financial or otherwise, with such sellers.

c. Use of facilities before acquisition by applicant.

d. Increased usefulness for defense purposes resulting from acquisition.

15. List below, by number in Appendix A, the facilities sought to be certified which are replacements describing (a) the replaced facility; (b) its age; (c) the annual rate of depreciation thereon; (d) the disposition which has been or will be made of the replaced facility; and (e) the reason for replacement:

Not applicable

16. The following statements are made by applicant evaluating the availability of manpower, housing, transportation, community facilities, and other elements of production in the area where the facilities described in Appendix A are used or to be used and whether Government assistance will be required to assure the availability of these elements of production:

Manpower, housing, transportation, communit facilities and other elements of production are available in the area and, hence, no Government assistance will be required.

17. Indicate possible uses of the facilities (for which certification is sought) for other than defense purposes at end of five (5) years, and the nature and extent of the conversion which would be required, if any.

The power station could continue to produce electric power at the end of five years. If the operation of the reactor were discontinued, conventional type coal furnaces could be installed to produce steam although it is not known at this time whether such conversion would be practical. Furthermore, the applicant's contract with the Commission will contain a six-months termination clause.

18. The following applications for necessity certificates for this plant at this location have been filed since September 23, 1950: None

Date of application (a)	Government file number (b)	Total of facilities in dollars on each application (c)	If final action has been taken, give date of: Issuance (d)	Denial (e)

19. To what extent is the location of these facilities dictated by national security considerations? State additional costs, if any, which will be incurred by reason of that fact Two other sites were considered, both of which were close to the densely populated areas of Pittsburgh, Pennsylvania. These sites were rejected for radioactivity reasons. At these sites, it would have been necessary to acquire valuable real estate at a substantial cost, many times greater than the costs incurred at Shippingport.

20. Have any applications been filed for allotment of controlled materials and/or rating for materials or equipment for this project? ☐ Yes ☒ No

If Yes, give details.

21. Persons authorized to represent applicant for the purpose of this application.

Name	Title	Address (Street, City, Zone, State)	Telephone number
W. D. Wall	Reed, Smith, Shaw & McClay, Counsel	747 Union Trust Bldg. Pittsburgh, Pa.	At 1-6105

CERTIFICATION - The undersigned, hereinafter referred to as the applicant, represents that the facilities listed in Appendix A are necessary in the interest of National Defense during the emergency period, and requests the issuance with respect thereto of a necessity certificate as provided under Section 124A of the Internal Revenue Code, and in support thereof submits the information contained in this application, and certifies that the facts herein set forth, or appended, are true and correct to the best of his knowledge and belief.

CORPORATE SEAL

Duquesne Light Company
Name of Applicant

Attest N. McAfee
Secretary

By
Signature of Authorized Official

September 2, 1950
Date

Philip A. Flager
Type or print name of Authorized Official

Applicant check one:

☐ Individual ☐ Partnership ☒ Corporation

Chairman of Board of Directors
Title

The U. S. Code, Title 18 (Crimes and Criminal Procedure), Section 1001, formerly Section 80, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction. The individual company information reported on this form is for use in defense mobilization activities. Persons who have access to individual company information are subject to penalties for unauthorized disclosure.

DUQUESNE LIGHT COMPANY

435 SIXTH AVENUE, PITTSBURGH, PENNSYLVANIA

APPLICATION FOR A NECESSITY CERTIFICATE PURSUANT TO PROVISIONS OF SEC. 124A (AMORTIZATION DEDUCTION) OF INTERNAL REVENUE CODE

STATEMENT

1. Briefly describe the facilities and indentify the principal materials and services produced or to be produced with facilities, described in Appendix A, for which certification is sought. Do not use general designations such as "Aircraft Parts" or "Radar Parts." In the case of service facilities such as cafeterias, offices, or plant protection, list principal materials and services of the plant facility served. Indicate clearly the relationship to existing facilities.

The facilities are a nuclear central power station consisting of (a) land of approximately 271 acres which was acquired by applicant in 1926 and 1933, land of approximately 234 acres which was recently purchased by applicant (see Item 12), and land of approximately 3 acres which applicant is now negotiating to purchase (see Item 12); (b) buildings containing a pressurized water reactor which will produce steam from fissionable (atomic energy) material and which will be constructed and equipped for the U. S. Atomic Energy Commission by Westinghouse Electric Corporation, with respect to which the applicant will assume not more than $5,000,000 of the cost thereof, and buildings containing a turbine generator of approximately 100,000-kilowatt capacity together with all appurtenant and auxiliary facilities betwene the steam throttle valve of the reactor and the applicant's electric transmission system, these facilities to be constructed and equipped by applicant; and (c) a site for development work and roads, fences, railroad sidings, barge facilities, offices, shops, storerooms, etc., relating to a conventional powerplant, these facilities to be constructed and equipped by applicant. The turbine generator plant will be so designed that additional generator capacity can be installed to the extent of a further 100,000-kilowatt capacity. The facilities will generate electric power which will be distributed by applicant complementary to its existing facilities. The facilities will be the first nuclear central power station and probably will not be competitive with power produced from a modern conventional plant as the station will be of an experimental nature and will be operated with the primary objective of gaining information and advancing reactor technology rather than with the objective of furnishing high load factor, dependable power.

2. Give reasons why the facilities for which certification is sought are necessary in the interest of National Defense. The applicant should apply carefully the criteria for determination of necessity and of portion attributable to defense purposes set forth in Sec. 600.2 of the regulation (Title 32A) governing the issuance of necessity certificates prescribed by the Administrator of the Defense Production Administration.

The facilities for which certification is sought are necessary in the interest of National Defense because the materials (i. e., technical information and processes which may be developed thereby) are directly required for the U. S. Atomic Energy Commission. Sec. 600.2 (a), Title 32A, of National Defense Appendix. The said Commission, the National Security Council and the Joint Committee on Atomic Energy of the Congress have all indicated that the development of nuclear power is essential and necessary in the interest of our National Defense.

The Research and Development Subcommittee of the Joint Committee of Congress on Atomic Energy submitted a report on the AEC 5-Year Power Reactor Development Program, which was approved and adopted by the full committee on March 23, 1954. In this report it was pointed out that while it was believed that the pressurized water reactor does not offer the greatest hope for the production of competitive and low-cost power, it is the only type of reactor now ready for full-scale construction, that the information and experience gained in the construction and operation of this type of reactor will be of benefit in the development of other types, that the pressurized water reactor might also contribute substantially to carrying out the President's international cooperation proposal, and that construction of a large-scale plant, such as the pressurized water reactor, is important as a demonstration of the serious intent of the United States to develop peace time uses of atomic energy

for both ourselves and our allies, and as a tool to help gain operating experience on a full-scale plant.

It is believed that the technical knowledge gained in the construction and operation of this plant will be of benefit in the United States Navy's atomic submarine program. Furthermore, it should be borne in mind that electric power is a major part of the total energy consumption upon which our industrial productivity is based and hence occupies a key position in our Nation's defensive capacity. Thus the development of atomic energy for the production of electric power contributes directly to the National Defense as well as to the civilian economy, and indirectly in that it might free for Government use in time of war such fuels as coal, oil, and gas now used for the production of electricity.

12. The following statements are made with respect to the land described in Appendix A:

a. Name and address of seller (or proposed seller) to applicant.

c. Use of land before acquisition by applicant.

Appendix A—Detail sheet—Land: Date acquired by applicant; cost to applicant.

Name and address of seller	Use of land before acquisition	Acreage	Date acquired	Cost
National Transit Co., Oil City, Pa.	Unused	2.841	(1)	[1] $500
Nick and Eleanore Beilich, Borough of Shippingport, Pa.	Residence	.379	July 12, 1954 [2]	[3] 9,000
Christiana F. Knoedler, Ambridge, Pa.	Unused	233.450	Apr. 10, 1954	12,000
Total		236.670		21,500

[1] Negotiating acquisition at said price.
[2] Agreement to purchase.
[3] Property acquired included a dwelling and outbuildings which will be razed.

Appendix A—Detail sheet—Buildings and other fixed installations and equipment.

The plan and design of the facilities are presently in the formative stage and have not progressed sufficiently to enable the applicant to furnish, at this time, the details of buildings and equipment which are required by Appendix A—Detail Sheet. No orders have been placed with respect to buildings and equipment. This application will be amended when the said information is available.

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AMENDED APPENDIX A - SUMMARY SHEET

(Applicant must attach hereto additional Appendix A sheets (numbered 2, 3, 4, etc.) supplying a description of each facility)

Location of facilities (State, County and Municipality)	Name of applicant
Pennsylvania, Beaver, Borough of Shippingport	Duquesne Light Company
Applicant (Check one) ☐ Individual ☐ Partnership ☒ Corporation	Address (Street, City, Zone, State) 435 Sixth Avenue Pittsburgh 19, Pennsylvania
Employer Identification Number reported on quarterly Federal OASI tax return (Form 941) 25 - 0451600	

Item (a)	Actual to Date (Dollars) (b)	Estimated remainder (Dollars) (c)
Land	21,000	500
Buildings and other fixed installations		2,500,000
Equipment Machine tools		
Other metal working machinery		
Power generating and distributing equipment		5,500,000
Furnaces		
Other equipment		
Other (Specify) Reactor		5,000,000
Grand total of all facilities, Appendix A	21,000	14,000,500

Give date of acquisition or beginning of construction, reconstruction, erection, or installation of the facilities: Construction will commence late in 1954 or early in 1955

Materials and services produced or to be produced (answer same as Item 1, Page 1, of application)

Electric power

Remarks

INSTRUCTIONS - Appendix A describes the facilities for which certification is sought and consists of the Detail Sheets on land, buildings, and equipment, and a Summary Sheet. The Summary Sheet is Page 1. The number of pages in the Appendix, including both the Detail Sheets and Summary Sheet, shall be indicated on the Summary Sheet and the Detail Sheets.

The detail required in this Appendix A is important in order to enable the certifying authority to determine necessity of the facilities in the interest of national defense and in order to assist the taxpayer in identifying the facilities for the Bureau of Internal Revenue (Appendix A will be attached to certificate).

If it is not possible at time of filing of application to identify the facilities in the detail asked, all available details should nevertheless be given and full details submitted as soon as possible.

If the Appendix A Detail Sheet is not appropriate to a description of the facilities, a statement may be attached describing the facility in terms best suited to the activity.

When a question is inapplicable, this should be so stated on the form.

If actual cost cannot be ascertained, estimated cost should be given. If there are any substantial changes in cost or in description before the issuance of the certificate, the applicant should notify the Defense Production Administration.

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AMENDED APPENDIX A - DETAIL SHEET

DESCRIPTION OF FACILITIES FOR WHICH CERTIFICATION IS SOUGHT

NAME OF APPLICANT	ADDRESS (Street, City, Zone, State)	DATE
Duquesne Light Company	435 Sixth Avenue Pittsburgh 19, Pennsylvania	November , 1954

NO. 1 LAND

SQUARE FEET (Approximate)	LOCATION OF LAND	DATE ACQUIRED BY APPLICANT
10,309,345	Borough of Shippingport Beaver County, Pennsylvania	*
Irregular FT. BY FT.	INDICATED BY AREA ENCLOSED BY RED LINE ON ATTACHED DRAWING MARKED: *	COST TO APPLICANT (Dollars) *

* See Statement Attached To Application

NO. 2 BUILDINGS AND OTHER FIXED INSTALLATIONS See Attached Statement

SQUARE FEET FLOOR SPACE (Approximate)	LOCATION OF BUILDING		DATE ACQUIRED OR CONSTRUCTION BEGUN BY APPLICANT
FT. BY FT.	CONSTRUCTION (WOOD, BRICK, CEMENT, ETC.)	FLOORS (Number)	COST TO APPLICANT

BUILDING INDICATED ON ATTACHED DRAWING AS BUILDING _____

EQUIPMENT See Attached Statement

NO. 3 NAME OF MANUFACTURER		SIZE	SPECIAL FEATURES	DATE OF ACQUISITION
KIND	MODEL NO.	TYPE	QUANTITY	COST (Dollars)
NO. 4 NAME OF MANUFACTURER		SIZE	SPECIAL FEATURES	DATE OF ACQUISITION
KIND	MODEL NO.	TYPE	QUANTITY	COST (Dollars)
NO. 5 NAME OF MANUFACTURER		SIZE	SPECIAL FEATURES	DATE OF ACQUISITION
KIND	MODEL NO.	TYPE	QUANTITY	COST (Dollars)
NO. 6 NAME OF MANUFACTURER		SIZE	SPECIAL FEATURES	DATE OF ACQUISITION
KIND	MODEL NO.	TYPE	QUANTITY	COST (Dollars)
NO. 7 NAME OF MANUFACTURER		SIZE	SPECIAL FEATURES	DATE OF ACQUISITION
KIND	MODEL NO.	TYPE	QUANTITY	COST (Dollars)

A necessity certificate is approximately 8 1/2 by 11 inches in size. Therefore, any drawings or maps which are included as part of Appendix A should, if possible, be made to conform to the size of the certificate. Elevations or working drawings are not needed.

(Over)

DUQUESNE LIGHT COMPANY

435 SIXTH AVENUE, PITTSBURGH 19, PENNSYLVANIA

APPLICATION FOR A NECESSITY CERTIFICATE PURSUANT TO PROVISIONS OF SEC. 168 (AMORTIZATION DEDUCTION) OF 1954 INTERNAL REVENUE CODE

STATEMENT

Amended Appendix A—Detail Sheet

Buildings and Other Fixed Installations.—The expenditures for buildings and other fixed installations, in the estimated amount of $2,500,000, will be charged by the applicant to Account 311—Structures, and will consist of the following:

Turbine Building (including Control and Auxiliary Rooms)
Screen House Building
Circulating Water Intake and Discharge Tunnels
Building Equipment (including Lighting, Plumbing, Fire Protection)
Land and River Improvements

The major portion of the estimated expenditure will be for the said Turbine Building.

Power Generating and Distributing Equipment.—The expenditures for power generating and distributing equipment, in the estimated amount of $6,500,000, will be charged by the applicant to the following accounts and will be made for various equipment as indicated:

Account 312—Boiler Plant Equipment, $800,000: Feedwater Equipment—Pumps, Instruments, Piping.

Account 314—Turbine Generator Equipment, $2,800,000: Turbine Generators, Condenser, Screen House Equipment, Instruments, Piping.

Account 315—Electric Plant Equipment, $1,500,000: Station Switchboards, Control Station, Station Battery Equipment, Excitation Equipment (excluding direct connected exciter), Generator Main Connections, 2300 and 460 Volt Switchgear and Transformers, Conductors, Conduit and Grounding.

Account 316—Miscellaneous Powerplant Equipment, $500,000: Air Compressors, Vacuum Cleaning System, Laboratory, Machine Shop, General Equipment (furniture, lockers, etc.), Fire Extinguishing System, Cranes and Hoists, Water Purification System, Miscellaneous Equipment (Stores, etc.).

Account 343—Transmission Substation (including main transformers), $900,000: Main Transformer, Oil Circuit Breakers, Disconnect Switches, Instrument Transformers, and Lightning Arrestors. Foundations and Structures for above. Conductors, Conduit and Grounding. Auxiliary Substation Equipment, Land Improvements, Fences and Yard Lighting.

Reactor, $5,000,000.—See statement attached to application.

DEPARTMENT OF COMMERCE,
BUSINESS AND DEFENSE SERVICES ADMINISTRATION,
Washington 25, September 23, 1954.

MEMORANDUM

To: Mr. John J. McGee, Room 2119—T–5 Bldg., Atomic Energy Commission.

From: Nathan D. Golden, Director, Scientific, Motion Picture, and Photographic Products Division, BDSA.

Subject: TA–28436, Duquesne Light Company.

Attached is the subject certificate of necessity application which is submitted for your comments and recommendations.

Please return your report together with the subject application to me in order that it may be incorporated with the reports from AEC and the Power Equipment Division of BDSA, prior to submission to ODM.

Attachment.

BOILING WATER REACTORS

Dr. LIBBY. The new and promising boiling water reactor concept initiated by the Argonne National Laboratory is now in its third stage. The first phase of developing water moderated and cooled reactors in which boiling is allowed to occur in the core was the 1953 project,

known as Borax I, at the National Reactor Testing Station in Idaho.

The successful experiments in which runaway conditions were imposed upon the reactor were continued in 1954 after some modification and reconditioning of the facility. In a final experiment on July 22, 1954, the power rose well over a million kilowatts in a tenth of a second and resulted in the destruction of the reactor core and some associated equipment. The conditions deliberately imposed in this test were much more severe than would occur in any accident that can be reasonably conceived.

A second boiling water reactor experiment, known as Borax II, was constructed immediately at the Idaho site. It became critical on October 19, 1954, and has been operating successfully since that date. Borax II has operated at a higher pressure and power than did Borax I but less than required for central station nuclear powerplants of this type.

However, Borax II is semipermanent, to enable operation during the winter months, and was built to demonstrate certain operational characteristics of a boiling water system.

It is now proposed to add a turbogenerator to Borax II for two reasons: It may provide data of value to the military in evaluating a small boiling water reactor as a possible design for future package-power units. Also it will quickly produce information applicable to the third stage of the program—the construction and operation of a 20-megawatt heat, 5,000-kilowatts electrical, Experimental Boiling Water Reactor (EBWR) powerplant proposed to be located at the Argonne National Laboratory near Chicago.

Like its Borax predecessor, the EBWR will use ordinary water as both moderator and coolant. This plant is intended to have the minimum capacity which will enable sound extrapolation to commercially interesting sizes. Sargent & Lundy of Chicago, Ill., was awarded a lump-sum contract for the architect-engineer phase and the first part of this work is completed. A lump-sum contract for the design, construction, and installation of the power equipment has been awarded to Allis-Chalmers Manufacturing Co.

The specifications require the power-system components to be leak-tight, thus enabling some evaluation of the possibility of using heavy water rather than ordinary water in boiling reactors. Heavy water is believed to offer some economic advantage in larger sized plants. Bids for the construction of the building will be invited shortly and construction is scheduled to begin by April. This reactor plant should be generating power during the latter part of 1956.

SODIUM GRAPHITE REACTOR

Nuclear powerplants based on graphite moderation and sodium coolant also continue to look promising for production of competitive power. Fabrication of a small experimental reactor designated SRE (Sodium Reactor Experiment), to be located at Santa Susana, near Los Angeles, Calif., is proceeding on schedule.

Responsibility for the design, fabrication, and operation of this reactor was assigned to North American Aviation, Inc. The contract provides for a total expenditure of $10 million during the period fiscal years 1954 through 1958. Approximately 40 percent of this sum is for fabrication of the reactor and associated buildings and 50 percent

will go to research and development. This contract with North American is one of the first joint Industry-AEC financial ventures. North American Aviation, Inc. will provide $2.5 million of the funds required.

Detailed design work for the SRE is essentially complete, site preparation has been completed, and building construction is in process. A large number of tests are being conducted on sodium pumps, fuel-handling equipment, fuel-rod cladding and assembly, zirconium welding, and reactor physics experiments. The major components of the reactor and cooling system are out for competitive fixed-price bid. Present schedules call for completion of fabrication by January 1956.

FAST BREEDER REACTORS

An important objective of the Commission's reactor program is the development of reactors capable of producing more fissionable material than they consume. The goal of the present fast breeder reactor program, under the direction of Argonne National Laboratory, is the construction and operation of a sodium-cooled, 62.5-megawatt heat, 15,000-kilowatts electrical, Experimental Breeder Reactor powerplant (EBR No. 2).

The first Experimental Breeder Reactor (EBR No. 1) located at the National Reactor Testing Station in Idaho, has maintained a continuous operating schedule since its startup in 1951, and provides the steppingstone to the much larger EBR No. 2, which probably will be built at the Idaho site also.

The development program for the Experimental Breeder Reactor No. 2 is now well underway. The complex physics problems that arise in fast reactors are being solved on the UNIVAC electronic computor at New York University. Reactor physics measurements required for the program were made with a subcritical core assembly using the neutron source reactor at the Argonne National Laboratory. These experiments are nearly completed.

The construction of a zero power fast critical assembly is nearing completion at the National Reactor Testing Station. This facility, scheduled to begin operation this spring, will provide accurate data for the detail design of the core of EBR No. 2. To demonstrate the engineering feasibility of the EBR No. 2 design, a half scale nonnuclear working model of the reactor portion of the plant has been designed and is being built at Argonne. It is scheduled to begin operation in March of this year.

Construction of EBR No. 2 is scheduled to start in 1956 and the reactor is scheduled to be in operation early in calendar year 1958.

Facilities to develop, manufacture, and reprocess fuel elements containing plutonium are essential for the development of fast breeder reactor powerplants. The architect-engineering for a facility, to be located at Argonne to develop and manufacture such elements, has been completed, bids for construction are being solicited, and it is scheduled for completion this year.

The Commission-sponsored program on fast breeder power reactors is supplemented by significant industrially supported effort being carried on by a study group—Atomic Power Development Associates.

HOMOGENEOUS REACTORS

The homogeneous reactor concept has certain potential advantages including low cost due to simplified design, economical chemical processing, and elimination of fuel-element fabrication. It is the objective of the Commission's homogeneous reactor program to provide the technology necessary to realize these potential advantages.

As we have previously reported, the homogeneous reactor program under the direction of the Oak Ridge National Laboratory consists of three major steps: HRE No. 1, which was shut down and dismantled early in 1954; HRE No. 2, a small pilot plant now under construction; and HTR (Homogeneous Thorium Reactor), an intermediate size reactor powerplant tentatively scheduled to be in operation by the spring of 1959. All of the homogeneous projects are located at Oak Ridge.

The development program for homogeneous reactors is composed of three main areas of study. These are component testing, a corrosion test program, and blanket and processing studies.

Considerable mockup and component testing for HRE No. 2 has been conducted and development work on components for the Homogeneous Thorium Reactor is underway. One of the principal problems involved is the possible corrosion of the reactor core and primary piping system with the fuel and blanket solutions. Extensive testing without radiation has indicated methods of maintaining adequately low corrosion rates on stainless steel, zirconium, and titanium. Recently, an extension program has been underway to evaluate the effect of reactor-induced radiation on the corrosion of materials of construction. Results from these experiments are still being evaluated.

The design power level for the HRE No. 2 has been increased and the scope broadened since our original report to you last February. The HRE No. 2 as now designed can be operated at 10 megawatts of heat. In addition to its primary purpose of demonstrating the long-term operational reliability of a homogeneous reactor, the HRE No. 2 will be able to incorporate a breeding blanket similar to that planned for large scale homogeneous power reactors.

Construction of the HRE No. 2, which is housed in the original HRE No. 1 building, began in July 1954. Erection of the underground steel-lined reactor cell has been completed. Fabrication has started on all major equipment, including the heat exchangers, core tank, pressure vessel, and circulating pumps. As a result of the increased scope of HRE No. 2, the scheduled start-up date is early 1956.

So much for the five specific projects now underway in the Power Reactor Technology Program. Other possible reactor approaches are under study.

OTHER REACTOR APPROACHES

A second variety of fluid fuel reactor has reached a stage of development at which it appears that a reactor experiment might be desirable. This is the liquid metal fueled reactor (LMFR) concept based on graphite as moderator and a solution or slurry of uranium in a liquid metal as fuel. Brookhaven National Laboratory has done most of the development work to date. Several economic studies indicate

that this reactor should produce power in a competitive cost range. A contract has been placed with the Babcock & Wilcox Co. to study the Brookhaven data and calculations with the objective of determining technical feasibility and possibly pointing out the need for additional design studies or determinations of engineering data. In addition, the Dow Chemical Co. has undertaken a contract aimed at modifying the LMFR design to provide more versatility of core loading and coolant. Reports on these studies will be available within 6 months.

Of the many remaining power reactor concepts under investigation, one utilizing hydrocarbons as moderator and coolant is perhaps the most advanced and may soon justify assembly of a reactor experiment. Hydrocarbons have many advantages for power reactor applications, particularly in the intermediate size range. They permit design of nearly the compactness of light water moderated and cooled units but operate at higher pressure without problems of corrosion and high pressure. North American Aviations, Inc., is studying this concept.

ADVANCED ENGINEERING DEVELOPMENT

The advanced engineering portion of the power reactor technology program is broad and, in general, of long-range character. By its very nature it contributes something to all reactors presently planned or conceived.

This portion of the program provides collections of basic data needed by reactor designers, explores new engineering ideas, and evaluates their importance to current or future reactor projects. It is in these activities that most new reactor concepts originate and attention is given to problems common to all reactor concepts such as waste disposal, fuel processing, safety, and shielding.

Nuclear measurements and studies of reactor physics have increased the scope of data available to reactor physicists, engineers, and designers. We have not yet advanced to a point at which sufficiently accurate nuclear calculations can be made to avoid the need for critical experiments for new designs. We are, however, advancing in that direction.

Considerable additional information has been accumulated on fuel materials, fabrication techniques, properties, and performance under reactor conditions. One of the more important areas for cost reduction in solid-fuel reactors is the development of fuel elements which will withstand very long reactor cycles and high percentage burnout of fissionable material. Associated with this, of course, are problems of corrosion which are particularly important in the water-cooled reactor systems. Definite progress is being made. Burnouts acceptable to civilian powerplants have been achieved on small experimental samples. However, the real tests will be provided by experience with full-scale elements in large numbers in the reactor plants now under construction.

A resond important area for cost reduction is the processing of irradiated fuel—an important component of any nuclear powerplant system. The particular processing requirement will depend upon the specific reactor concept. For example, a reactor which uses an aqueous solution of uranium as fuel can easily be adapted to incorporate an

aqueous chemical processing system. For many other reactor types, there may be real advantage in a separation process which operates with the fuel in metal form. The value of the material makes it important to have short holdups for processing and low inventories of fuel outside of the reactor. Various processing systems adaptable to such needs are under continuous study. Sufficient progress has been made to justify confidence that suitable processing methods will be available as needed for each of the reactor concepts currently under investigation.

Coolant materials generally considered for reactor systems—water, liquid metals, hydrocarbons—are not particularly new to industrial application, but to use them in reactors requires the development of a great deal of new technology. This is being done both in connection with specific reactor projects and as part of the general engineering development. This effort includes such things as studies of boiling, burnout, phenomena, dissassociation by radiation, heat transfer, and development of pumps, valves, and container systems.

There are also problems of radiation, waste disposal, and other environmental factors associated with normal operation. In our studies satisfactory progress is being made on these problems both from the standpoint of avoiding serious environmental contamination and doing so at a cost which should not be a determining factor in whether or not nuclear plants will be economicaly competitive.

MILITARY POWER REACTORS PROGRAM

The various military reactor projects are designed to meet specific requirements of the Armed Forces but they are making substantial contributions to advancing the technology needed in developing economic civilian nuclear power.

NAVAL REACTORS PROGRAM

The Naval reactors program, a joint Atomic Energy Commission and Department of Defense project, is aimed at the development of reactors suitable to various naval vessels for which nuclear power is desirable.

The initial naval reactors program consisted of two projects, the submarine thermal reactor and the submarine intermediate reactor. The program has been expanded. An advanced nuclear powerplant for a submarine and a reactor suitable for large ship propulsion have been added to the program.

SUBMARINE THERMAL REACTOR

The submarine thermal reactor (STR), so named because it uses the heat generated by uranium fissions caused by neutrons which have been slowed down or thermalized, is cooled and moderated by ordinary water under pressure. Its land prototype, the STR Mark I, was constructed to submarine specifications at the National Reactor Test Station in Idaho and has been operating for well over a year.

The STR Mark II plant has been installed in the U. S. S. *Nautilus* which on January 17, 1955, got underway on nuclear power for sea trials.

Both the STR Mark I and Mark II powerplants were built for the Commission by the Westinghouse Electric Corp. at the Bettis plant of the Atomic Energy Commission.

SUBMARINE INTERMEDIATE REACTOR

The submarine intermediate reactor (SIR) is cooled by liquid metal and gets its heat from uranium fissions caused by neutrons in the intermediate energy range. The prototype of this reactor, SIR Mark A, is being finished at West Milton, N. Y., and testing has begun.

Construction of the submarine, U. S. S. *Sea Wolf*, in which the SIR Mark B plant will be installed, is underway at the Electric Boat Division of General Dynamics Corp.

Research and development of the Mark A and Mark B plants is continuing at the Knolls Atomic Power Laboratory, near Schenectady. This laboratory is operated by the General Electric Co. for the Commission.

SUBMARINE ADVANCED REACTOR

The Knolls Atomic Power Laboratory is working on the development of an advanced nuclear powerplant which will give a submarine higher speed than the STR or SIR powerplants and show other improved characteristics.

LARGE SHIP REACTOR

A project for research and development work on a reactor suitable for large ship propulsion was started during fiscal year 1955. The pressurized water reactor type has been selected for this reactor. Work on this project is being done at the Commission's Bettis plant, Pittsburgh, Pa.

AIRCRAFT REACTORS PROGRAM

The United States Air Force has a continuing requirement for a solution to the problem of combining in aircraft acceptable altitude and speed performance with extreme long range and endurance capability. Based on present technology, aircraft nuclear propulsion systems appear to offer the only possible solution to this problem without the use of in-flight refueling. The Air Force and AEC are engaged in a joint development program directed toward providing such propulsion system. When successfully developed and placed in service, nuclear-propelled aircraft should be capable of sustained flight limited only by the crew's endurance.

The principal characteristic of an aircraft reactor which distinguishes it from other power reactors is the stringent requirements for high temperature combined with high power per unit or system weight. The system must fit in an airframe of practical size and produce energy at a temperature high enough to be efficiently utilized by an aircraft powerplant. The development efforts of the AEC program have therefore been concentrated on high temperature metallurgy, efficient shielding systems, and methods of obtaining high heat transfer rates. The Air Force program is concerned with developing airframes and engines compatible with the aircraft reactor types

under development by the AEC. Both programs include radiation damage investigations and utilization of supporting research and development tools.

In developing a successful aircraft reactor the Commission must continuously push forward the frontiers of reactor technology. All reactor development will share in the benefits.

Progress in several development fields has been such that increased optimism is warranted in this program. The President in his fiscal year 1956 budget message to Congress noted this increase optimism when he said:

> The Atomic Energy Commission and the Department of Defense will expand and accelerate research on atomic powered aircraft.

While details of the work must remain classified there is good reason to believe that technical progress in this effort will continue at an accelerated pace, and that the prospects for nuclear-powered flight have been considerably brightened.

ARMY PACKAGE POWER REACTORS PROGRAM

In December 1953, the Department of Defense established requirements for development of nuclear powerplants to supply heat and electricity in remote and relatively inaccessible military installations. A range of a few hundred kilowatts to approximately 40 megawatts was specified, with air transportability of major plant components for final assembly at remote sites indicated as desirable.

Accordingly, the Commission undertook development of suitable reactor plants to meet these military requirements. Studies by the Corps of Engineers and by the Commission indicated that reactor plants could feasibly be adapted to these requirements and, further, that over a period of 6 to 8 years' operation, the nuclear system might be economically favored over the conventionally fueled systems which they would supplant.

The joint AEC–DOD program, termed the Army Package Power Reactor Program was set up early in 1954. This program brings together the interests of the three military services as regards small, land-based, nuclear powerplants.

After careful study of many possibilities it was decided to develop a small reactor plant to meet the needs of remote military installations in the Arctic. The Corps of Engineers and the Oak Ridge National Laboratory had concluded that a heterogeneous pressurized water, enriched uranium reactor of about 10 megawatt heat capacity and producing approximately 1,200 kilowatts electricity and 2,500 kilowatts (eqivalent) of steam for space heating would fulfill the most urgent Arctic base requirement which exists now. This protype has been designated the APPR and it is proposed to be located at the Engineer Research and Development Laboratories at Fort Belvoir, Va.

APPR CONTRACT

On December 10, 1954, a lump-sum- fixed-price contract was signed with the Commission by the American Locomotive Co., Schenectady, N. Y., for design, construction, and test operation of the prototype APPR. The agreed total contract price is $2,096,753, which will be borne jointly by the Commission and the Department of the Army.

The APPR will be composed of a pressurized light water cooled and moderated, enriched uranium fuel, heterogeneous reactor of approximately 10 megawatt heat capacity. Steam from the heat exchanger will drive a turbine generator set to produse approximately 2,000 kilowatts—steam for heating will not be tapped from the prototype plant—which will supply power to the Fort Belvoir load in parallel with the existing system. Design will include maximum precautions for prevention of spread of contamination in event of an unforeseen accident. Aside from these containment features, however, the prototype will be designed to demonstrate the air transportability of major plant components for field erection.

CONTRACT APPROACH

A significant feature of the APPR contract is that it represents the first reactor design and construction project to be launched on a lump-sum, fixed-price basis in contrast to the cost-plus-a-fixed-fee basis under which previous reactors have been built. Great interest in the project was shown by private industry. Ninety-four industrial concerns or groups of firms indicated a desire to be invited to bid on the project. By August 1953, 33 of these firms had qualified for invitations to submit proposals for the engineering design, construction, and guaranteed test performance of the APPR plant on a lump-sum basis. Eighteen of the thirty-three invitees submitted proposals.

The quality of proposals received evidence the strong interest and technical competence of the concerns submitting them, and revealed that many concerns have organized their technical staffs in such a way as to deal most effectively with the "package power" concept of reactor engineering.

FURTHER MILITARY AND CIVILIAN INTEREST

The Department of Defense stated requirement covered a powerplant range from a few hundred kilowatts up to about 40 megawatts. APPR will meet the most urgent requirement, which appears to be between 1 and 2 megawatts.

Plans for the future call for eventual construction of other plants included in this military requirement. Progress of the civilian reactors under way under the Commission's 5-year plan will be followed closely to evaluate their applicability to the requirements for the large (5–40 megawatts) military plants.

The small package powerplant concept, which is designed to meet the stated military requirements, may be well suited also to nonmilitary power needs. The Rural Electrification Administration, for example, has expressed strong interest in package powerplants to fill needs in outlying, high power cost areas. Indications are that a large part of the foreign market lies in the range below 30 megawatts of electrical capacity. Such applications as mining operations and outlying industrial plants also appear likely for package power reactors These and other relatively small power requirements definitely stand to benefit from the successful accomplishment of the Army Package Power Reactors Program.

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Chairman ANDERSON. I think probably this is enough for today, because this would involve a long, long question period, I would think, if we started in with it.

If any member has a question he wants to submit now, fine.

Representative COLE. Just a very quick one. I was curious to know what the spread was in the first package reactor bid, which you say was the first one on a fixed price and was let for $2 million odd.

Mr. NICHOLS. From 2.6 up to 9 million dollars.

Representative DURHAM. Following that question, didn't we build a couple of those reactors at Arco on a competitive basis?

Mr. NICHOLS. This is the first one, sir.

Representative DURHAM. Are you sure?

Mr. NICHOLS. We built parts of plants out there on a competitive bid basis, but no reactor.

Chairman ANDERSON. We will adjourn the hearing. The hearing tomorrow is executive and not open. The committee will meet by itself at 10:30, and with the full Atomic Energy Commission at 2 o'clock. Open hearings will again be held on Thursday.

(Thereupon at 5:10 p. m., Tuesday, February 1, 1955, a recess was taken until 10:30 a. m., Wednesday, February 2, 1955, the committee to meet in executive session.)

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

THURSDAY, FEBRUARY 3, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met at 2 p. m., pursuant to adjournment, in room P63, the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson (chairman), Gore, Jackson, Hickenlooper, Millikin, and Bricker; and Representatives Durham, Holifield, Price, Kilday, Cole, Hinshaw, Van Zandt and Patterson.

Present also: Corbin C. Allardice, executive director, and George Norris, Jr., counsel to the Joint Committee; and Walter A. Hamilton of the professional staff of the Joint Committee.

Chairman ANDERSON. The Joint Committee will be in order.

I believe we have a change in the order of witnesses.

STATEMENTS OF LEWIS L. STRAUSS, CHAIRMAN OF THE UNITED STATES ATOMIC ENERGY COMMISSION; THOMAS E. MURRAY, MEMBER; DR. WILLARD F. LIBBY, MEMBER; KENNETH D. NICHOLS, GENERAL MANAGER; WILLIAM MITCHELL, GENERAL MANAGER; AND JESSE C. JOHNSON, DIRECTOR OF RAW MATERIALS, ATOMIC ENERGY COMMISSION

Mr. STRAUSS. We would like to present at this time Dr. Jesse Johnson, the Chief of the Raw Materials Division, to discuss and present the report on the domestic uranium program. Dr. Johnson is leaving for Denver, and we appreciate this opportunity of taking the item out of order.

It is the paper marked "No. IX, Domestic Uranium Program."

Chairman ANDERSON. You may proceed, Dr. Johnson.

Dr. JOHNSON. I would like to read our prepared statement, Mr. Chairman.

Today the United States is one of the world's leading uranium producers and our production is expanding rapidly. Seven years ago we had practically no production, estimated proven reserves of uranium ore were less than current annual production and our potential reserves were largely a matter of geological conjecture.

There were large areas of the Colorado Plateau region that had produced uranium-bearing ores off and on for a period of nearly 50 years but the history of these operations did not indicate promise for large-scale production. Most of the deposits that had been found

were relatively small and widely scattered. They had been found by searching the canyons and rims of the mesas for outcrops, and it was thought that much of this area where outcrops might be exposed had been prospected.

However, the Commission at the beginning of its program was faced with an urgent need for additional uranium supplies. With over 90 percent of this vital defense material then coming from overseas, it was of utmost importance to develop uranium production on the North American Continent, particularly in the United States. Since known uranium deposits could not sustain a production rate of importance, the problem was to find and bring into production new deposits.

The Colorado Plateau was the most favorable area we had to explore and some uranium production could be obtained as soon as the small vanadium mines could be reopened. Most of the ores contain both vanadium and uranium but for years vanadium had been the sole interest. Mining for vanadium had been active during the war but early in 1944 the Government vanadium program was terminated and nearly all the mines were closed. Wartime uranium operations on the Colorado Plateau were limited to reprocessing tailings from vanadium mills under secret contracts with Manhattan Engineer District. No attempt was made to mine ores for their uranium content.

The most important decision made by the Commission in setting up the domestic uranium program at the beginning of 1948 was to place uranium production almost completely in the field of competitive private industry, with Commission activities designed to assist and promote private participation.

Those familiar with the mining industry know that the best way to find mineral deposits is to provide an incentive for prospectors, miners, and exploration companies to get out in the hills and search. No Government exploration organization could possibly achieve the results that have been obtained by the thousands of enthusiastic uranium prospectors and miners with high hopes of striking it rich.

The incentive offered by the Commission under the domestic uranium program was a guaranteed market for uranium ores at favorable prices, a haulage allowance, and special production bonuses. Assistance provided by the Commission includes geological information and free testing of samples submitted by prospectors and the general public, sponsorship of access roads, establishment of local ore-buying stations, and testing and development of prospective methods and techniques, including those for radiometric surface and airborne surveys.

When the program was established there was practically no private prospecting or exploration for uranium. Even interest in the Colorado Plateau vanadium ores, which also contain uranium, always had been largely local and the two large vanadium companies had conducted most of the milling operations. There was a lack of information on the geology and mineralogy of uranium deposits, and on the processing of the ores for recovery of uranium. Information and instruments developed by the wartime atomic energy program had possibilities of wide application in exploration for radioactive minerals. Consequently, there was a need for some major projects to be carried on at Commission expense.

The Commission's exploration program had been important in bringing domestic uranium production to present levels and in developing basic data for planning future expansion. The Commission's staff and the United States Geological Survey conduct most of the exploration activities with some participation by the Bureau of Mines. The Survey and the Bureau of Mines operate in this field under contracts with the AEC.

The exploration program covers the entire United States, including Alaska, with the work concentrated in areas such as the Colorado Plateau, where uranium deposits have been found. The problem on the Colorado Plateau was to find ore deposits which did not outcrop or which had inconspicuous surface showings. Uranium minerals at the surface oxidize to bright colored varieties and most of the well-exposed deposits undoubtedly had been found.

The program undertaken by the Commission consisted of comprehensive geological investigations and mapping, detailed studies of known deposits, development of ideas regarding conditions favorable for uranium occurrence, and extensive drilling of geologically favorable areas. There were large areas selected for drilling which were vacant public lands—private industry had been unwilling to assume the exploration risks or had considered the prospects unfavorable. Prior to drilling such lands were withdrawn from mineral entry so that the Commission would control the deposits discovered at Government expense.

Both the geological and drilling programs have been greatly expanded. Government drilling increased from 28,000 feet in fiscal year 1948 to 1,228,000 feet in 1954. The important change, however, has been in private drilling. In 1948 there was practically no private drilling; in 1954 private drilling was more than double that of the Government. Commission drilling not only developed important ore reserves but pointed the way for private industry.

The discovery of an exceptionally large, rich uranium deposit by private drilling produced a uranium boom of substantial proportions and further emphasized the possibilities of geological drilling. During the past year other important deposits have been found by private operators drilling on the basis of geological evidence rather than outcrops.

The pattern has been somewhat the same for airborne radiometric surveying. The United States Geological Survey and the Commission pioneered this method of exploration after developing or adapting instruments and operating procedures. Today there are more private airborne radiometric surveys than Government. The largest uranium deposit known in the United States was found as a result of such a private survey.

The individual prospectors and miners, so important in the early discovery and development of the country's mineral resources, have been responsible for the discovery of many uranium deposits since the start of our program. They have been the pioneers in new areas and deserve much of the credit for extending the producing areas of the Colorado Plateau and for the discovery and development of uranium deposits in Wyoming and South Dakota. They now are at work in Nevada, California, Idaho, Montana and many other States. As a result of these efforts, together with airborne radiometric surveys

and organized Government and private exploration projects, new uranium producing areas undoubtedly will be opened up in the United States.

As compared with the search for other metals, which has been going on for decades, prospecting for uranium has only just begun. On the other hand, probably no other metal has been subject to such an intensive search and no mineral industry has grown to such major proportions in such a short period of time as uranium.

With private enterprise now doing more of the type of exploration drilling that only the Commission was willing to undertake a few years ago, Government drilling may be reduced as soon as exploration has been completed on public lands already withdrawn. Future Commission drilling will be largely for geological information to guide the work of prospectors and miners, particularly in new areas where little is known about the nature and occurrences of the ore bodies. Airborne and geological reconnaissance surveys will be continued to cover all parts of the United States having possibilities for uranium. Reports and maps giving the results of such surveys will be made available to the public as soon as possible.

Other important continuing functions will be detailed geological mapping, interpretation of data, examination of prospects and mines, and estimation of ore reserves. We must keep informed of all new developments in order to plan our production program. We also must evaluate potential resources of low-grade uranium-bearing materials such as the phosphate and shale deposits. These deposits may be called upon to supply the nuclear fuel for future industrial power.

Exploration activities, both private and Government, have been discussed in some detail because they are directly responsible for the large increase in our domestic ore production and for the firm plans we now have for major expansion. The effort that will be devoted to prospecting and exploration, and the success of this effort, will determine whether the United States will continue to be a major uranium producer. The known deposits of the type now being mined will be depleted in a relatively few years under the production program now planned. A high rate of discovery will be required to maintain the scheduled production levels.

A few brief statistics will serve to indicate the expansion in domestic production of uranium ore. Today more ore is being produced each month than in the entire year of 1949, the year after our program got underway. On the basis of known deposits current production rates are scheduled to double within a few years. In the spring of 1948, there were only 15 small operations with a total of about 50 employees and these operations were for vanadium, with uranium as a byproduct. At the end of 1954, there were over 800 producing uranium mines with more than 4,000 men engaged in the mining operations. Prior to 1948, only 2 or 3 ore bodies containing 100,000 or more tons had been found in the entire history of the Colorado Plateau. Today at least 15 ore deposits containing more than 100,000 tons are known and at least 1 deposit has been proven to contain several million tons. The domestic uranium mining industry including prospecting, mining, milling and construction now has an annual value on the order of $100 million.

In 1948, there were only two small mills in operation for processing uranium-bearing ores. These were vanadium mills to which facilities for uranium recovery had been added. Nine uranium ore processing plants are now in operation in our Western States, seven of these have expansion programs underway and additional milling projects and expansions will be under construction this year. Although the capacity of milling facilities has shown about the same percentage increase as ore production, there has always been a lag. The Commission has endeavored to provide a market for all uranium ore offered for sale in order to assist the new mining operations. Newly discovered deposits are often brought into production before exploration and development have provided a reasonable indication of the potential ore reserves. Consequently ore begins to flow before plans can be made for milling facilities and after a decision 12 to 18 months are required for mill design and construction. This has resulted in a large accumulation of ore above ground. Most of the present stockpiles are at locations where mill construction is underway or planned.

All uranium mills, with the exception of the one at Monticello, Utah, are privately financed, owned and operated. Some of the large new mills will involve capital investment of around $10 million.

A major contribution to the milling program has been the technical data and the new processes developed by the Commission. The mills now are recovering much more of the uranium from the ores than at the beginning of the program. The new processes which have been developed in Commission laboratories and carried through the pilot-plant stage are being adopted by all of the new mills. They will result in further improvement in metallurgical recovery, lower costs and lower prices for the end product.

The Commission's pilot plant at Grand Junction, Colo., not only develops to the production stage processes conceived in the laboratories but is available to prospective contractors for continuous small-scale test runs of the ores to be treated in the proposed mills. Without such facilities and the technical information available from the Commission, each new contractor would have to undertake extensive studies and construct and operate a pilot plant before making the substantial investment required for one of the new mills.

Domestic uranium production has had a phenomenal development and has become an important industry to several Western States. There is reason to believe that production can be maintained at a high level. However, to maintain high production there must be active exploration and development. For example, if prospecting and exploration were to stop today, by March 31, 1962, the present termination of our domestic uranium ore buying circular, most of our known ore deposits would be exhausted. To bring production back to present levels might then be a much more difficult task than we have had during the past 7 years.

This points to the need of considering a long-range Government buying policy—one that may be needed to cover a period between the defense market and a commercial market of reasonable size.

Chairman ANDERSON. Mr. Allardice will present the questions of the staff.

Mr. ALLARDICE. At the close of your remarks, Mr. Johnson, you comment briefly on the need for a long-range Government buying

policy. What are the technical reasons for recommending consideration of such a policy?

Dr. JOHNSON. A 7- to 10-year market is required to justify private capital to go into prospecting and exploration. Anyone undertaking exploration and prospecting for uranium or any other metal for that matter must expect with good luck to spend 1 to 2 years at least in finding a deposit. Then there is at least 1 or 2 years in development and getting ready for production.

In order to justify such a venture, there should be an assured market for, say, approximately 5 years. In other words, we need a considerable lead time in order to maintain the prospecting and development effort needed to maintain our position as an important uranium producer.

Furthermore, I believe that the Government owes to the people now spending money in trying to find uranium deposits and developing deposits, at least 5 years' prior notice to any change or reduction in the present buying program.

We have had buying programs in the past for a period less than 7 or 8 years. But I think that most of the people who have been spending money out there have been going on the assumption—and I am sure they have that assumption today—that there will be a continuing market for uranium.

Mr. ALLARDICE. Will there be a change in the law required to effect such a long-term policy for buying?

Dr. JOHNSON. That I cannot say. I am not qualified to comment on that statement.

The program, in looking ahead for a period that might possibly run beyond a defense effort, certainly it would mean a different approach to the problem—I would assume it would—than we have had during the past 5 or 6 years.

Mr. ALLARDICE. It is my recollection that there is not any time limit on the guaranteed prices of our source material, but I would like Mr. Mitchell to comment on that if he could.

Mr. MITCHELL. That is right, Mr. Allardice, Section 66 gives the Commission authority to guarantee prices without any time limit.

Mr. ALLARDICE. Has the executive branch prepared any recommendations on such a policy, Mr. Johnson?

Dr. JOHNSON. No, sir, not to my knowledge. The matter has been discussed.

I might say that it has been a matter of special interest to me, having been a miner, and I have had experience during the war period with the sudden termination of a number of the programs for stimulating metal production for war defense. I have seen those programs cut off overnight, and I have seen them revived again after a year or two for another program, and it was at my suggestion that some thought might be given to a long-range program for uranium.

Representative DURHAM. When you speak about a long-range program, you mean some kind of legislation such as the Stockpiling Act, or something that will give you authority to go out and stockpile it?

Dr. JOHNSON. My own thought is that a statement of general policy from an official source might be extremely helpful to the mining industry. The question has come to me on a number of occasions "What can we expect after the defense program is terminated?"

First, we cannot predict when defense requirments might be met, but I did endeavor to try to get some information on uranium requirements for the power program. That indicated that it would probably be at least 1980 before the United States uranium requirements for industrial power might reach a figure that would support a uranium mining operation of reasonable size.

Representative DURHAM. Well, you comment here on page 7, at the bottom of your statement there, where you said the Commission has endeavored to provide a market for all uranium ore offered for sale in order to assist the mining operations.

Have you not actually provided a market and have you not taken all of the uranium ore you could buy?

Dr. JOHNSON. Yes, we have been doing that, and we have a commitment to do that until March 31, 1962. The decision will have to be made as to whether that program will be extended beyond March of that year.

Representative DURHAM. You are operating at the present time in an entirely different manner than we have on strategic metals, because we have laws whereby we can stockpile, if you can get the money, and we have had no trouble in getting the money for the last 10 or 12 years. Do you not think that we should begin thinking of a policy of laying down a long-range policy here that we will know where we are at, instead of buying it by the Commission, whatever you can buy?

Have you reached that point, would you say?

Dr. JOHNSON. I think the whole matter, sir, justifies careful study. That was the reason for inserting that suggestion in here, merely to provoke discussion.

Representative DURHAM. You made pretty encouraging statements as to what we could do in the power field, provided it happens that we can use it. I believe you have made the statement on one of your speeches that there would be plenty of uranium to take care of the power needs.

If we are going to continue the present operation of owning and controlling all of it, which I think we should, I think we should begin to look to a long-range policy on this thing.

You have just a year-by-year policy, and you come up here and get your money from year to year, and the mining industry is not very stable on that kind of a condition.

Dr. JOHNSON. That is correct, sir.

Representative DURHAM. I think that you have made a very wise statement a while ago, when you said you had seen other critical metals be such as to close the mines, and then we have to open them up again. We have had to do that several times. They have a pretty definite policy on the other, and I think we should think of this, because certainly this is one of the most important things.

Mr. NICHOLS. We feel that the Commission has authority to make whatever determinations are necessary under the law, and new legislation is not necessary, but Mr. Johnson was pointing out quite a problem.

Representative DURHAM. I think you have, too. But you are making a decision down there, and when you put in a separate law I think that you should have a separate piece of legislation to define it so people will know exactly where they are at.

Mr. ALLARDICE. Mr. Johnson, in your speech of September 22, in San Francisco, you said—

there is no doubt about having sufficient nuclear fuel for the future power industry.

Could I infer from that that you believe that future power industry may not be sufficient to support the rate of mining now engaged in on the plateau?

Dr. JOHNSON. May I have that question again? I am sorry.

Mr. ALLARDICE. Should I infer from that statement that you doubt that the power industry will absorb the production at a rate now obtaining on the plateau?

Dr. JOHNSON. My remarks in San Francisco were based upon a consideration of the world uranium picture and the projected nuclear power development covering the free world.

With reference to the United States uranium production, production from the type of ores that are now supplying our domestic plants, the question there is one of rate of discovery. If we can maintain a rate of discovery on the order of that which we have had during the past 4 or 5 years, we certainly should be able to supply from domestic sources the nuclear power requirements of the United States for a matter of 40 years or more.

In other words, if we could maintain production at the present rate, domestic sources alone from the type of ores we are now mining could supply the power requirements that we can foresee or at least according to projections that might be developed around up to 1990, or so.

But the requirements as far as I can gather from studying figures that I have received from our Division of Reactor Development, the requirements for industrial power are not likely to reach a level that could support the present uranium production for another 30 years. That is 20 to 30 years.

Mr. ALLARDICE. The limitation on power in your view is not on the availability of uranium ores or uranium concentrates?

Dr. JOHNSON. No, sir.

Mr. ALLARDICE. The Commission now has posted guaranteed prices——

Senator HICKENLOOPER. Might I ask a question right at that point?

Mr. Johnson, I take it that your answer is based upon a continuation of roughly the present concepts of the utilization of uranium. If some new concept or scientific discovery or new techniques that are radically different might come into effect within the next decade, it might alter your estimates somewhat, might it not?

Dr. JOHNSON. Yes, sir. The basic figures that I obtained from our Division of Reactor Development for the calculation is that for each 1 million kilowatts of electrical capacity, about 600 tons of natural uranium would be required for the initial inventory. Following that, 50 tons of natural uranium would be required for annual replacement on the basis of a 2-percent burnup.

Now I have used the figures of a 2-percent burnup. With a 3-percent burnup, which I think our reactor people feel is something that might not be too difficult, the 50 tons of annual replacement would drop to 33 tons. If the burnup was 10 percent, the annual requirement would drop to 10 tons.

Senator HICKENLOOPER. Thank you. I was only concerned in the basis for your answer, which I assumed was on the idea of the continuation substantially of the present concept of utilization.

Dr. JOHNSON. Yes.

Senator HICKENLOOPER. And if some radical new discovery, or some theory which is only a theory now, might find feasible or practical use, it might alter substantially the predictions which you gave?

Dr. JOHNSON. Yes. It also disregards the development of breeders on any large scale.

Senator HICKENLOOPER. Thank you.

Mr. ALLARDICE. The Commission now has posted guaranteed prices for uranium ores, of certain percentages. Does it have posted prices for uranium concentrates?

Dr. JOHNSON. No, sir. The price paid for uranium concentrates are determined by negotiation with prospective mill operators. The reason for that, and there are many, are primarily that we believe that the key to getting out uranium production at the start was to establish ore prices that would be adequate to stimulate prospecting and mining.

If we got the ore, we would be able to negotiate milling contracts. The mills that were in operation at the time we started our program had been vanadium mills, and had added facilities for uranium recovery. There was a great deal of work to be done in trying to develop improved processes for the recovery of uranium from ores. As a matter of fact I think the major improvements, or radical improvements have been made in the last 2 years, or a year and a half. They are still to be put into operation here. They will be going into the new mills.

Any uranium concentrates price that might have been established on the basis of the mills that were in operation when we started this program would have been far out of line, both from the standpoint of recovering of uranium and from the cost of production.

Representative DURHAM. Do you think that our imports will be fairly steady, as they have been?

Dr. JOHNSON. Our imports of uranium and procurement from abroad is expanding very rapidly, as well as supplies from Canada.

Representative DURHAM. Have we invested any Federal funds in that in the last 12 months; our own money?

Dr. JOHNSON. For foreign facilities, you mean?

Representative DURHAM. For offshore operations and delivery. Have we had to invest any money to try to get more ore? I mean by that, have you had any expansion?

Dr. JOHNSON. Yes, sir. The program set up with South Africa, and as revised in 1950, and as amended later, calls for increased production and the bringing in of new mills into the program. These mills have been financed by loans from the Export-Import Bank, and from the British Government.

Senator HICKENLOOPER. I would like to make sure that I understood the answer, Mr. Chairman.

Are we increasing or decreasing as far as our purely domestic production is concerned?

Dr. JOHNSON. Our domestic production is rising percentagewise at a more rapid rate, and will rise or continue to rise over any of our foreign procurement. We started out in 1948, as I mentioned, with

practically no production, and we are going to be right on the top place, or right in top place, along there, in world production.

Senator MILLIKIN. Are we reaching the percentage of domestic production that we thought was a safe level for operations?

Dr. JOHNSON. Our program has continued to be that of getting as much domestic production as possible, and we have no "safe level" in mind as I recall, Senator. We are on the way up.

Senator MILLIKIN. What I meant to say was that as I recall it, in studying the figures of production in the past, when you have been here and others, we thought we were getting too much dependence upon importation of the material. We thought it would be better to increase our domestic supply. Are we increasing our domestic supplies at a satisfactory level?

Dr. JOHNSON. Yes, sir. we are increasing our domestic supplies at a much higher rate than was conceived possible only a few years ago. Also, the Canadian production is increasing rapidly, so that North American production in prospect, or the level that will be reached in a few years, is in excess of what we thought might be available throughout the whole world only a few years ago.

Senator MILLIKIN. Have you found that production has been responsive to price?

Dr. JOHNSON. Yes, sir, it has been responsive to price, and probably equally important as you understand, to the effect of a few rich strikes by some lucky individuals or successful prospectors, you might say.

Senator MILLIKIN. If you put up the price, they will go out and hunt for it; is that right?

Dr. JOHNSON. That is right. But until someone has made a success in the business people were still reluctant. But there have been enough successes among the prospectors for uanium that we now have a uranium boom.

Senator MILLIKIN. In other words, that is another way of saying that they have found through development and exploration and price, those factors that cause people to go out and find the stuff?

Dr. JOHNSON. That is correct, sir.

Representative DURHAM. Well, you purchase all of the domestic and foreign ore that you can secure. There has been none offered to you that you have not bought; is that correct?

Dr. JOHNSON. That is correct.

Mr. ALLARDICE. As of now, with some development in the techniques of concentrating, do you see advantages to fixing a guaranteed price for concentrates?

Dr. JOHNSON. I think that eventually with a commercial market, or as we approach something that will be comparable to a commercial market, there should be or would then be a fixed price for concentrates, possibly eventually a fixed price for metal.

I think it would be quite difficult to have a uniform concentrate price, and at the same time an ore price. When concentrate prices dominate, then the mills set the price for the ore, and the miners accept that price or go out of business. I do not think in this country we have quite reached that point.

Mr. ALLARDICE. Thank you. How much public lands has the Commission withdrawn from mineral entry since 1948?

Dr. JOHNSON. The total withdrawals and temporary segregations have amounted to 879 square miles on the Colorado Plateau area, and in Wyoming 102 square miles; a total of 981. There have been 425 square miles restored. We still have under withdrawal about 550 square miles with another 100 due for restoration this year.

Mr. ALLARDICE. What are the Commission's plans for the lands it now holds?

Dr. JOHNSON. I believe the lands should be restored to public domain as rapidly as possible, and that withdrawals should be extremely limited from here on. We might even hope that it may not be necessary to make any withdrawals.

Mr. ALLARDICE. On lands on which the Commission has discovered uranium, what methods are available to you for leasing the land out for development,

Dr. JOHNSON. We initiated a leasing policy in 1949 which was one of selection by the raw materials staff after review of the qualifications of the various applicants.

That leasing arrangement seemed to be quite satisfactory at the time. Interest in the uranium mining was extremely limited. Under a competitive bidding system the small miners would not have had an opportunity to get some of the smaller leases. We were dealing at that time largely with small leases. There were few companies on the outside that would come in and bid on a competitive basis.

We followed the system of a selection. There have been no leases granted since the end of 1953. We have had under study the possibility of revising the leasing procedures. The mining industry is quite divided on what method should be used. The Colorado Mining Association has taken a definite position that it is in favor of a continuation of the existing system. The uranium ore producers have suggested a lottery system under which from among the applicants a group of qualified applicants would be selected, and then the one to get the lease would be selected by lottery.

At the last session, as you will recall, I think Congressman Rogers of Colorado introduced an amendment or proposed an amendment to the Atomic Energy Act making competitive bidding mandatory. Those are the three methods or procedures that are being most strongly considered. There may be other methods that have advantages.

Mr. ALLARDICE. I do not wish to ask you what method the Commission will utilize, but does the Commission have a conceptual approach to this problem which it is exploring?

Dr. JOHNSON. We have been exploring all of the methods, and our Grand Junction office has supplied us with detailed reports. Before arriving at a definite decision it was the view that there should be public hearings out West.

Mr. ALLARDICE. Did Grand Junction recommend that?

Dr. JOHNSON. Yes, sir.

Mr. ALLARDICE. That is the present plan of approach of the Commission, to have hearings before making its final decision?

Dr. JOHNSON. That is correct, sir.

Mr. ALLARDICE. Thank you.

Senator MILLIKIN. Mr. Chairman, I would like to ask when you expect to have those hearings?

Dr. JOHNSON. We would like to hold them within the next month.

Senator MILLIKIN. Who would be present?

Dr. JOHNSON. The Commission hearings would probably be held by our Grand Junction office, with possibly representation from the Washington staff.

Senator MILLIKIN. You have not set the date definitely?

Dr. JOHNSON. No, sir.

Mr. ALLARDICE. I have two more questions.

How many leases have been issued by the Commission and how many have you pending, held pending this decision as to the approach you will henceforth use?

Dr. JOHNSON. There are about 49 leases outstanding. I think that possibly only 35 of those—there are 49 leases which have been issued, and I think only 35 are now active.

In the deposits that have been sufficiently explored to be available for leasing, it is our tentative idea that they could be divided into about 15 individual mining operations. There would be about 15 leases to be issued. We have about 300 applications on file.

Mr. ALLARDICE. How much money has the Government spent each year on access road development? What proportion has been Federal and State?

Dr. JOHNSON. I do not think I have figures broken down by years, but from the inception of the program through fiscal 1954, the total cost of the access road program has been $5,771,000. State matching funds have amounted to $152,000.

I do not think that does the States and counties—that that is quite fair for the States and counties. There was no Federal funds available for access roads prior to 1950 when Congress reinstituted an access-road program to mining properties. Probably no roads were actually built and ready for us until some time in 1951. There is the lag between appropriations, the surveys, and the construction of the roads.

During the period of 1948, 1949, and probably most of 1951, the entire road program was carried by States and counties. Not only is the question of access roads involved, but also the maintenance of roads already built.

Many of the roads in that Colorado plateau area are rather crude affairs, built to serve either a local community or perhaps only a few farmers, or a relatively small population.

When the uranium industry became active, and uranium traffic over these roads was heavy, those people that had satisfactory roads before for their own needs had practically nothing. The roads were badly shot, so that the access program has included in addition to bring in roads into new areas, the improvement of some of the roads that were already built.

Now, the States and counties have carried a good deal of the maintenance work on roads of that kind, and some of it has, after 1950—or the reconstruction work of the existing roads—has been done under the Federal program.

Mr. ALLARDICE. Has the Federal cost of access roads been included in cost analyses of the products made in Commission plants?

Dr. JOHNSON. No, sir, we have not. As a matter of fact, until fiscal 1954 the appropriations by Congress were made to the Bureau of Federal Roads under the access-road program established by Congress in 1950. I am mistaken.

Through fiscal 1954 the appropriation for fiscal 1955 was to the Commission. The Department of Commerce felt that the Commission should request the appropriation, rather than the Department of Commerce.

An appropriation was granted of $2.5 million for fiscal 1955, and those funds have been transferred to the Bureau of Federal Roads for the construction of access roads approved by the Commission.

Mr. ALLARDICE. The answer I was hoping to get was that this would be an insignificant part of the cost.

Dr. JOHNSON. That answer is correct, sir.

Mr. ALLARDICE. I note you state the Commission has a policy of placing uranium production almost completely in the field of competitive private enterprise, and only one mill has been built by the Commission.

What are the reasons for the Commission's owning and operating this mill at Monticello, on a cost-plus-fixed-fee basis?

Dr. JOHNSON. The mill at Monticello was acquired by the Commission in 1948, or soon after I came with the Commission. It was then owned by the War Assets Corporation. It had been built by the RFC during the war as a vanadium plant, and the Commission acquired it at that time. There were only two milling companies that had been in the business, and they would have been the only two that might have had an interest in purchasing this mill.

We also hope to be able to use the mill to improve the metallurgical process and another consideration was the fact that the existing mills in the area were only willing to take uranium ores that were suitable for treatment with the processes that they used. As a result, the Monticello mill has, in the terms of the local people, received all of the cats and dogs in the way of different varieties of ores.

We have had a problem there of trying to develop a process sufficiently flexible so that we could treat a wide variety of ores. It has only been as I mentioned earlier, in the last year and a half that we have developed a process, or processes, that we think now can handle all types of ore that might be offered.

There is one other problem in disposing of the mill. We have not only a large stockpile of ore of miscellaneous kinds, but some of the tailings from the earlier operations of the mill should be re-treated.

One company in the latter part of 1953 suggested that it might be interested in acquiring Monticello mill, and we said "Go ahead and give us a proposal." The tentative proposal was such that it presented so many problems, both from the standpoint of getting fair value for the facilities that the Commission has, and arrangement for treating this variety of ores including the tailings that it seemed the best way to proceed was to retain that mill under Commission ownership, and undertake an expansion of that mill because we could move much faster in expanding the mill than trying to negotiate an extremely complicated contract.

Mr. ALLARDICE. I have two more questions which I think I can ask briefly, and you can answer briefly.

Where are the maps of diamond drilling and exploration results of radiometric surveys posted and where are AEC development and exploration reports available to the public?

Dr. JOHHSON. I have a large list.

Chairman ANDERSON. If it is a large list, would you put them in the record, please?

Dr. JOHNSON. Yes, sir; they are posted at local areas, where the surveys are made, and then the maps are available now through the Superintendent of Documents, and through our regional offices.

(The list referred to follows:)

LOCALITIES AT WHICH MAPS SHOWING THE LOCATIONS OF RADIOACTIVE ANOMALIES DETECTED BY AIRBORNE RECONNAISSANCE ARE POSTED

United States Atomic Energy Commission, Salt Lake City Exploration Branch, 222 Southwest Temple Street, Salt Lake City, Utah.
United States Atomic Energy Commission, Hot Springs Suboffice, Evans Hotel Annex, Hot Springs, S. Dak.
United States Atomic Energy Commission, Casper Suboffice, Post Office Box 1891, 148 North Beech, Casper, Wyo.
United States Atomic Energy Commission, Butte Suboffice, room 315, Post Office Building, Butte, Mont.
United States Atomic Energy Commission, Ishpeming Suboffice, room 2, Post Office Building, Ishpeming, Mich.
United States Atomic Energy Commission, Ore-buying Station, Shiprock, N. Mex.
United States Geological Survey, Post Office Box 71, Custer, S. Dak.
United States Geological Survey, 305 Federal Building, Casper, Wyo.
Geological Survey of Wyoming, University of Wyoming, Laramie, Wyo.
United States Atomic Energy Commission, Denver Exploration Branch, Building 40, Federal Center, Denver, Colo.
United States Atomic Energy Commission, Grand Junction Operations Office, Grand Junction, Colo.
United States Atomic Energy Commission, Albuquerque Suboffice, 142 Northeast Monroe Street, Albuquerque, N. Mex.
United States Atomic Energy Commission, Richfield Suboffice, room 26, CPA Building, Richfield, Utah.
United States Atomic Energy Commission, Phoenix Suboffice, 137 North Second Avenue, Phoenix, Ariz.
United States Atomic Energy Commission, Ore-buying Station, Monticello, Utah.
United States Geological Survey, 1412 Big Horn Avenue, Worland, Wyo.
United States Bureau of Mines, Metallurgical and Mining Division, School of Mines Campus.

FEBRUARY 4, 1955.

LIST OF LIBRARIES WHERE UNCLASSIFIED REPORTS ARE AVAILABLE FOR EXAMINATION

(NOTE.—Libraries marked * are official United States Atomic Energy Commission depository libraries in which copies of all unclassified reports prepared by and for the Commission are available. The others receive only those reports prepared by or for the Division of Raw Materials, USAEC.)

ALABAMA

Public Library, Birmingham.
Department of Archives and History Library, Montgomery.
University of Alabama Library, University.

ARIZONA

Department of Library and Archives Library, Phoenix.
University of Arizona Library, Tucson.

ARKANSAS

University of Arkansas Library, Fayetteville.

CALIFORNIA

*University of California General Library, Berkeley.
Pomona College Library, Claremont.
Free Library, Eureka.

County Free Library, Fresno.
Public Library, Los Angeles.
*University of California Library, Los Angeles.
University of Southern California Library, Los Angeles.
California Institute of Technology Library, Pasadena.
California State Library, Sacramento.
Public Library, San Francisco.
Stanford University Library, Stanford.

COLORADO

University of Colorado Library, Boulder.
*Denver Public Library, Denver.
United States Department of the Interior, Bureau of Mines Library, Region IV, 224 New Customhouse, Denver.
Colorado State College Library, Fort Collins.
Colorado School of Mines Library, Golden.
Public Library, Grand Junction.

CONNECTICUT

Connecticut State Library, Hartford.
Trinity College Library, Hartford.
Wesleyan University Library, Middletown.
*Yale University Library, New Haven.
University of Connecticut Library, Storrs.

DELAWARE

University of Delaware Library, Newark.
Wilmington Institute Free Library, Wilmington.

DISTRICT OF COLUMBIA

*Library of Congress, Washington, D. C.
United States Bureau of Mines Library, Washington, D. C.
United States Geological Survey Library, Washington, D. C.

FLORIDA

University of Miami Library, Coral Gables.
University of Florida Library, Gainesville.
Florida State Library, Tallahassee.

GEORGIA

University of Georgia Library, Athens.
*Georgia Institute of Technology Library, Atlanta.
Georgia State Library, Atlanta.

IDAHO

University of Idaho Library, Moscow.
Idaho State College Library, Pocatello.
University of Idaho, Southern Branch Library, Pocatello.

ILLINOIS

Chicago Public Library, Chicago.
*John Crerar Library, Chicago.
Public Document Department Library, Chicago.
*University of Chicago Library, Chicago.
Northwestern University Library, Evanston.
Illinois State, General Library, Division Library, Springfield.
*University of Illinois Library, Urbana.

INDIANA

Indiana University Library, Bloomington.
Public Library, Fort Wayne.
Indiana State Library, Indianapolis.
*Purdue University Library, Lafayette.
University of Notre Dame Library, South Bend.

IOWA

*Iowa State College Library, Ames.
State Traveling Library, Des Moines.
Grinnell College Library, Grinnell.
State University of Iowa Library, Iowa City.

KANSAS

University of Kansas Library, Lawrence.
Kansas State Library, Topeka.

KENTUCKY

*University of Kentucky Library, Lexington.
Free Public Library, Louisville.

LOUISIANA

*Louisiana State University Library, Baton Rogue.
Howard-Tilton Memorial Library, New Orleans.
Tulane University Library, New Orleans.

MAINE

University of Maine Library, Orono.

MARYLAND

Enoch Pratt Free Library, Baltimore.
The Johns Hopkins University Library, Baltimore.

MASSACHUSETTS

Amherst College Library, Amherst.
Boston Public Library, Boston.
State Library, Boston.
*Harvard University Library, Cambridge.
*Massachusetts Institute of Technology Library, Cambridge.
Wellesley College Library, Wellesley.
Free Public Library, Worcester.

MICHIGAN

*University of Michigan Library, Ann Arbor.
*Detroit Public Library, Detroit.
Michigan State College Library, East Lansing.
Michigan College of Mining and Technology Library, Houghton.

MINNESOTA

*University of Minnesota Library, Minneapolis.
Minnesota State Library, St. Paul.
Public Library, St. Paul.

MISSISSIPPI

Mississippi State College Library, State College.
University of Mississippi Library, University.

MISSOURI

University of Missouri Library, Columbia.
*Linda Hall Library, Kansas City.
Public Library, Kansas City.
Missouri School of Mines Library, Rolla.
Public Library, St. Louis.
Washington University, St. Louis.

MONTANA

Montana School of Mines Library, Butte.
Public Library, Helena.
Montana State University Library, Missoula.

NEBRASKA

University of Nebraska Library, Lincoln.
Municipal University of Omaha Library, Omaha.

NEVADA

Nevada State Library, Carson City.
University of Nevada Library, Reno.

NEW HAMPSHIRE

University of New Hampshire Library, Durham.
Dartmouth College Library, Hanover.

NEW JERSEY

Rutgers University Library, New Brunswick.
*Princeton University Library, Princeton.
New Jersey State Library, Trenton.

NEW MEXICO

*University of New Mexico Library, Albuquerque.
New Mexico State Law Library, Santa Fe.
New Mexico School of Mines Library, Socorro.
New Mexico College of Agricultural and Mechanical Arts Library, State College.

NEW YORK

New York State Library, Albany.
Buffalo University Library, Buffalo.
*Rockwood Memorial Library, Buffalo.
*Cornell University Library, Ithaca.
American Geographical Society Library, Broadway at 156th Street, New York.
American Museum of Natural History Library, 77th Street at Central Park West, New Yok.
College of the City of New York Library, New York.
*Columbia University Library, 116th Street at Broadway, New York.
Engineering Societies' Library, 29 West 39th Street, New York.
*New York Public Library, 42d Street at Fifth Avenue, New York.
Public Library, Lenox Branch, New York.
Public Library, Montague Branch, Brooklyn.
University of Rochester Library, Rochester.
Union College Library, Schenectady.
Syracuse University Library, Syracuse.
*Rensselaer Polytechnic Institute Library, Troy.

NORTH CAROLINA

University of North Carolina Library, Chapel Hill.
*Duke University Library, Durham.
Agricultural and Technical College Library, Greensboro.
*North Carolina State College Library, Raleigh.
North Carolina State Library, Raleigh.

NORTH DAKOTA

University of North Dakota Library, Grand Forks.

OHIO

Bowling Green State Library, Bowling Green.
Public Library, Cincinnati.
University of Cincinnati Library, Cincinnati.

*Cleveland Public Library, Cleveland.
Ohio State Library, Columbus.
*Ohio State University Library, Columbus.
Public Library, Dayton.
Oberlin College Library, Oberlin.
Miami University Library, Oxford.
Public Library, Toledo.

OKLAHOMA

Southeastern Teachers' College Library, Durant.
University of Oklahoma, Norman.
Oklahoma State Library, Oklahoma City.
*Oklahoma Agricultural and Mechanical College Library, Stillwater.

OREGON

*Oregon State College Library, Corvallis.
University of Oregon Library, Eugene.
Library Association, Portland.

PENNSYLVANIA

Muhlenberg College Library, Allentown.
Lehigh University Library, Bethlehem.
Lafayette College Library, Easton.
Free Library, Philadelphia.
*University of Pennsylvania Library, Philadelphia.
*Carnegie Library of Pittsburgh, Pittsburgh.
University of Pittsburgh Library, Pittsburgh.
Public Library, Reading.
Pennsylvania State College Library, State College.

RHODE ISLAND

Public Library, Providence.

SOUTH CAROLINA

Clemson College Library, Clemson.
University of South Carolina Library, Columbia.

SOUTH DAKOTA

Lincoln Memorial South Dakota State Library, Brookings.
State School of Mines and Technology Library, Rapid City.
University of South Dakota Library, Vermillion.

TENNESSEE

*University of Tennessee Library, Knoxville.
*Joint University Libraries, Nashville.

TEXAS

Texas State, Austin.
*University of Texas Library, Austin.
West Texas State Teachers' College Library, Canyon.
Texas Agricultural and Mechanical College Library, College Station.
Public Library, Dallas.
Southern Methodist University Library, 3436 University Boulevard, Dallas.
Public Library, Fort Worth.
Rosenberg Library, Galveston.
Public Library, Houston.
Texas Technological College Library, Lubbock.
Carnegie Library, San Antonio.

UTAH

Utah State Agricultural College Library, Logan.
Brigham Young University Library, Provo.
Salt Lake City Public Library, Salt Lake City.
*University of Utah Library, Salt Lake City.

VERMONT

University of Vermont Library, Burlington.
Middlebury College Library, Middlebury.
Vermont State Library, Montpelier.
Norwich University Library, Northfield.

VIRGINIA

Virginia Polytechnic Institute Library, Blacksburg.
Virginia State Library, Richmond.
University of Virginia Library, University.

WASHINGTON

Washington State Library, Olympia.
State College of Washington Library, 1819 B Street, Pullman.
Public Library, Seattle.
*University of Washington Library, Seattle.
Spokane Public Library, Spokane.

WEST VIRGINIA

West Virginia University Library, Morgantown.

WISCONSIN

*University of Wisconsin Library, Madison.
Public Library, Milwaukee.

WYOMING

Wyoming State Library, Cheyenne.
University of Wyoming Library, Laramie.

Chairman ANDERSON. Now we will take up any additional questions by members of the committee.

Representative HOLIFIELD. Did I understand you to say, Dr. Johnson, that these maps of the Commission's explorations are available to the public?

Dr. JOHNSON. Yes, sir.

Representative HOLIFIELD. And the results of that exploration?

Dr. JOHNSON. Yes, sir.

Representative HOLIFIELD. That is public knowledge?

Dr. JOHNSON. Yes, sir.

Representative HOLIFIELD. But so far your methods of leasing has been through selective negotiation, I believe you said?

Dr. JOHNSON. Yes, sir.

Representative HOLIFIELD. And not through the three methods?

Dr. JOHNSON. The other two methods; that is right.

Representative HOLIFIELD. Now, in the leasing of this land that has been leased, I believe you give the net that we now have and the amount withdrawn, but I do not believe you give the amount that has been leased although you gave the number of leases. You said 49 leases and 35 now active. That was the number, I believe.

What size leases were those leases? Just in general; were they large leases or small leases?

Dr. JOHNSON. They vary, sir. Generally they were small leases.

Representative HOLIFIELD. Are some of them large?

Dr. JOHNSON. There were two large leases; one was made to United States Vanadium Co. at the beginning of the program and it was tied in with a contract to expand their own mill.

Another one was made to the Climax Uranium Co. in negotiations under which the Climax Co. built a mill in Grand Junction.

Representative HOLIFIELD. What was the extent of those leases in square miles, or acreages, whichever way you specify them?

Dr. JOHNSON. I am not sure that I have those figures, sir.

Representative HOLIFIEPLD. If you do not have that available, will you supply a list of them to the committee? That will be all that will be necessary.

Dr. JOHNSON. Yes, sir.

(The list referred to follows:)

List of active leases on Commission-controlled lands

Lease No.	Date of issuance	Name of lessee	State	County	District	Acres
C-305	Jan. 17, 1949	Vanadium Corp. of America.	Arizona	Apache	Carrizo Mountains.	960
ML-1	May 17, 1949	Tom Skidmore	Colorado	San Miguel	Slick Rock	40
ML-4	July 29, 1949	Dulaney Mining Co	do	do	do	[1] 370
C-36	July 1, 1949	U. S. Vanadium Co	do	Mesa	Calamity Mesa	840
ML-6	May 30, 1949	Henry Holling	do	San Miguel	Slick Rock	92
C-526	July 10, 1950	Climax Uranium Co	do	Mesa	Outlaw Mesa	[1] 1,040
ML-8	Oct. 23, 1950	Arthur Canfield	do	San Miguel	Slick Rock	[1] 118
ML-10	Jan. 5, 1951	LaSalle Mining Co	do	Montrose	Club Mesa	56
ML-11	Jan. 15, 1951	U. S. Vanadium Co.	do	do	do	50
ML-13	Apr. 30, 1951	Bunker & Co	do	do	do	11
ML-14	Oct. 19, 1951	U. S. Vanadium Co	do	do	Long Park	46
ML-15	Aug. 23, 1951	Vanadium Corp. of America.	do	do	Club Mesa	99
ML-16	Mar. 1, 1951	Kemp and Hirth	do	San Miguel	Slick Rock	4
ML-17	Sept. 26, 1951	Jack Turner	do	do	do	20
ML-18	Nov. 13, 1951	W. B. McCormick	do	do	do	40
ML-19	Apr. 8, 1952	U. S. Vanadium Co	Utah Colorado	Grand Mesa	Polar Mesa	4
ML-20	Nov. 16, 1952	San Juan Leasing Co	do	San Miguel	Slick Rock	77
ML-23	Apr. 3, 1952	Vanadium Corp. of Americs.	do	Montrose	Long Park	99
ML-24	Sept. 3, 1952	Max Barkley & Co	do	do	Club Mesa	25
ML-27	July 16, 1952	Gamblin & Knowles	do	San Miguel	Slick Rock	21
ML-29	June 30, 1952	Ortmayer Mining Co	do	do	do	70
ML-30	July 28, 1952	M. L. Watters	do	do	do	74
ML-32	Nov. 12, 1952	Blue Creek Mining Co	do	do	do	41
ML-35	Jan. 15, 1953	Cottonwood Mining Co	Utah	Grand	Cottonwood	27
ML-36	Mar. 1, 1953	Sinbad Mining Co	do	do	do	16
ML-37	May 1, 1953	Shattuck Denn Mining Co.	Colorado	Montrose	Club Mesa	157
ML-39	May 15, 1953	The Golden Cycle Co	do	do	Atkinson	92
ML-41	Nov. 1, 1953	Gardner & Co	do	do	Club Mesa	30
ML-43	Nov. 15, 1953	Roy Kamholz	do	San Miguel	Slick Rock	40
ML-44	do	Richard L. Duncan	do	do	do	[1] 55
ML-45	Dec. 1, 1953	Maley & Almond	do	do	do	74
ML-46	Dec. 5, 1953	Gayno Mining Co	do	do	do	41
ML-47	Feb. 1, 1954	Worcester Mines	do	Montrose	Dolores B	30
ML-48	Feb. 6, 1954	James E. Fahrion	do	San Miguel	Slick Rock	118
		Total				4,877

[1] Figure includes acreage added subsequent to original issuance.

List of leases terminated, expired, or reissued

Lease No.	Date of issuance	Name of lessee	State	County	District	Acres
ML-2[1]	June 28, 1949	Minerals Engineering Co.	Colorado	San Miguel	Lower San Miguel.	70
ML-3[1]	July 15, 1949	William A. Hooten	do	do	Slick Rock	80
ML-5[1]	Oct. 20, 1949	J. B. Crowley	do	do	do	82
ML-7	Jan. 12, 1950	Neilson & Larson	do	do	do	60
ML-9[1]	Oct. 23, 1950	Max W. Barkley & Co.	do	do	do	71
ML-12[1]	Dec. 4, 1950	W. A. Hopkins	do	do	do	41
ML-21[1]	Jan. 16, 1952	Baird Bros	do	do	do	56
ML-22[1]	Mar. 14, 1952	Fahrion & Sagrillo	do	do	do	118
ML-25	Apr. 22, 1952	Johnson & Hargrove	do	do	do	44
ML-26[1]	May 13, 1952	Willoughby & Richards	do	Montrose	Club Mesa	30
ML-28	June 18, 1952	Duncan & Sanchez	do	San Miguel	Slick Rock	21
ML-31	Sept. 8, 1952	Ace Turner	do	Montrose	Blue Creek	7
ML-34	Feb. 1, 1953	Small Spot Mines	do	Mesa	Calamity Mesa	5
ML-38[1]	May 15, 1953	Worcester Mines	do	Montrose	Dolores B	30
ML-40	June 20, 1953	M. E. Akin	Utah	Grand	Cottonwood	6
ML-42	Nov. 15, 1953	Blixt Bros	Colorado	San Miguel	Slick Rock	20
C-165	Aug. 15, 1951	Mining Research Corp	do	do	do	20
		Total				761

[1] Reissued and included in list of active leases.

Representative HOLIFIELD. Were any of the other uranium mills that were put in also given large acreage leases as an inducement for them to be established?

Dr. JOHNSON. No.

Representative HOLIFIELD. Your testimony shows that extensive exploration has taken place in the past few years in the Colorado plateau, in Wyoming, and other places, under existing practices.

Did I understand you to say that you are now recommending that higher prices be offered?

Dr. JOHNSON. No, sir.

Representative HOLIFIELD. Longer range contracts at existing prices?

Dr. JOHNSON. No. My only purpose in suggesting a possible long-range policy was because the uranium procurement during the period I have been with the Commission has been entirely for defense purposes, and I have had some uncertainty in mind as to what the Government policy might be if defense requirements were met, and if that should happen before an industrial commercial market for power of considerable size had developed.

Representative HOLIFIELD. Would it be your point then that that price should be based on a subsidy price which would be tentatively fixed at a higher rate than the commercial market, or the expected fuel value of it——

Dr. JOHNSON. No, sir. I think that that problem of a long-range price, in looking forward say 10 years, we have our price now to March 31, 1962—the defense program might extend beyond that period—I think we will be looking somewhere on a long-range program to a period when we might have a concentrate price rather than an ore price. Purchasing might be on the basis of contracts with milling companies. What the program would be, I think should be a matter of study if there is to be such a program.

Representative HOLIFIELD. Would your thought be that if that program is developed, that rigid prices on either ore or concentrates should extend for a longer period than 7 years at a time?

Dr. JOHNSON. I think it is necessary to have a guaranteed market for a period of something between 7 and 10 years. If you have a guaranteed market there must be a guaranteed minimum price. Otherwise, you haven't a guaranteed market.

Now, whether that minimum price, in looking ahead, could be something below that which might be expected to be paid, and then periodically raised, that is a question that I think needs to be explored.

Representative HOLIFIELD. Do you know of any other metallic ore prices that are guaranteed by the Government for longer ranges than 7 years, except possibly gold?

Dr. JOHNSON. I know of no other metal, sir, that is dependent entirely upon the Government for a market.

Representative HOLIFIELD. How about gold?

Dr. JOHNSON. I think gold in the past, prior to the 1930's, when the price of gold was raised from $20 there was a free market for gold throughout the world and there is a free market in most countries today for that matter.

Representative HOLIFIELD. That is true, but we are talking about production on the Colorado and Wyoming plateau, and the Government is the only buyer of gold as I understand it and the only buyer of uranium.

So my question still stands: Do you know of any other metallic ore prices guaranteed for a long-range period of time?

Dr. JOHNSON. No, sir.

Representative HOLIFIELD. The purpose of guaranteeing a long-range rigid price on either ore or concentrates would be for the purpose of allowing capital investment to provide for an amortization figure on a known guaranteed market, it is not?

Dr. JOHNSON. If there were known deposits, it would not be so important. The importance of the problem as I see it is in order to have uranium coming out of the ground 6 or 7 or 8 or 10 years from now, there must be prospecting and exploration. There must be a large amount of venture capital going into the business of hunting for the material.

I do not think that you are going to get that kind of capital either through individual effort or investment, unless the people that are hunting and taking long chances think that they are going to be able to have a market in which they can sell the product if they find it.

Representative HOLIFIELD. We are getting that exploration now under the present setup, are we not?

Dr. JOHNSON. That is correct, we have been maintaining that.

Representative HOLIFIELD. And it is increasing every year, is it not; the exploration activities are increasing?

Dr. JOHNSON. That is correct, sir.

Representative HOLIFIELD. And we are finding more of it all of the time?

Dr. JOHNSON. That has been true, particularly during the last 2 years.

Representative HOLIFIELD. I believe that is all, Mr. Chairman.

Representative COLE. I think it may be of interest to the public, and I know the committee is aware of the information, to be told if you can tell us, the extent of American capital investments in the foreign mining in South Africa, the African area, and Australia?

Dr. JOHNSON. The amount of American capital, you mean?

Representative COLE. Yes.

Dr. JOHNSON. In South Africa, the Export-Import Bank loans I believe were roughly about $120 million to $130 million.

Representative COLE. Of which two-thirds comes from American capital?

Dr. JOHNSON. That is the American participation; and $60 million from the British. It is one-third and two-thirds.

Representative COLE. Then the total investment in South Africa alone is nearly $200 million?

Dr. JOHNSON. It is approaching $180 million.

Representative COLE. Of which two-thirds comes from the Federal Treasury?

Dr. JOHNSON. Yes, the Export-Import Bank.

Representative COLE. Through its participation in the bank?

Dr. JOHNSON. Not loaned by the Commission; that is right.

Representative COLE. Is there a capital investment of American public funds in the Congo?

Dr. JOHNSON. Not in the sense of a capital investment.

Representative COLE. How about Australia, what are the dollar investments?

Dr. JOHNSON. In South Australia, I believe the total amount of loans amount to about—these figures would be subject to correction—something of the order of $14 million. One-third is United States, and one-third is British. The loans are guaranteed by the Commonwealth Government without reference to the uranium production.

Representative COLE. The South African loan is to be replaced by production?

Dr. JOHNSON. The production contracts provide for the amortization of the loans.

Representative COLE. Out of the production of the mine?

Dr. JOHNSON. Yes, sir.

Representative COLE. Can you tell us, is it sensitive information for you to tell us when it can be anticipated the loans will be paid out of South African production?

Dr. JOHNSON. By December 31, 1966.

Representative COLE. What is the date with respect to Australia?

Dr. JOHNSON. I cannot give you the exact date, but it is a couple of years earlier.

Representative COLE. In 1964, then?

Dr. JOHNSON. Well, 1963, possibly.

Representative COLE. At any rate, the Government is assured of return of its investment?

Dr. JOHNSON. That is right.

Representative COLE. Out of the production of these mines?

Dr. JOHNSON. That is right.

Representative COLE. In your statement you indicated that at the beginning of the Commission's program, it was acquiring 90 percent of its ore material from sources overseas. Now, is it a matter that I can——

Senator MILLIKIN. Might I hear the question again?

Representative COLE. Mr. Johnson said that at the beginning of the Commission's program, it acquired 90 percent of its ore material

from overseas sources. I would like to know if it can be disclosed publicly, the percentage of source material which the Commission now acquires from overseas.

I am not sure that you should say so, but if you can say so, I think that the public would be interested in learning.

Dr. JOHNSON. I do not think that I should give the figures.

Representative COLE. Very well, that is all.

Senator MILLIKIN. May I ask whether the Commission will make available to this committee statistics along that line from the beginning to the present time, and what we are getting from abroad and what we have? We have had that kind of information.

Chairman ANDERSON. We have that information.

Representative COLE. I was only seeking an opportunity to disclose it if in the judgment of the Commission, Mr. Johnson felt it could be disclosed.

Senator MILLIKIN. I am not talking to that point, but I am talking to the point of getting the information for the committee.

Chairman ANDERSON. We have the information before the public.

Representative HOLIFIELD. If you will yield.

You testified, I believe, that American capital was not interested in the Belgium Congo development. Is that true, Dr. Johnson?

Dr. JOHNSON. No; I said that there were no loans to the Belgium Congo for capital investment, and we have no investment figures. We do have advances against production in the Belgium Congo, though.

Representative HOLIFIELD. Would the gentleman say that there is no American investments in the Union Miniere duHaut Katanga Holding Co.?

Dr. JOHNSON. Private investment, do you mean?

Representative HOLIFIELD. Yes; private American investments.

Dr. JOHNSON. I am not certain as to that. There were some British interests in the Union Miniere at one time, and whether there has been any American purchases of British interests, I am not sure. I have seen something in the paper a year or two ago, and I imagine it would be Miniere.

Mr. STRAUSS. We would have no way of finding out, Mr. Holifield.

Chairman ANDERSON. There is no government in it, is that not correct? Although there apparently was, it was by a bank of United States of certain British shares.

Dr. JOHNSON. That is correct.

Representative COLE. It might be appropriate to give Dr. Johnson an opportunity to give expression if he can, in behalf of the Commission, with respect to the degree of cooperation between the Belgium Government and its Congo operations and South African Government and our own Commission.

Chairman ANDERSON. I would be happy if you would do that, Dr. Johnson. Briefly, though, if you can, please.

Representative COLE. Has it been very good, or exceptional?

Dr. JOHNSON. We have had excellent cooperation with the Belgium Government, the Union Miniere, and the Government of South Africa. I believe that the programs undertaken, and the production that has been made available to the United States, and the speed of the program, and the priorities that have been granted to the program have been based upon a desire to cooperate in the defense program rather than a matter of commercial gain.

Representative COLE. Can you make the same statement with respect to Australia?

Dr. JOHNSON. Very definitely; yes. I also want to state that we have had the closest cooperation with Canada. The Canadian effort to develop uranium production was initiated and has been carried out to supply our defense program. The Canadian uranium effort has met with success comparable to our own.

Representative COLE. That is all.

Senator JACKSON. Mr. Johnson, we are not getting too much uranium under this program. There is no danger that we are putting too much of an incentive——

Dr. JOHNSON. No, sir; I think the question of supply and requirements is one that would have to await an executive session.

Senator JACKSON. As a matter of fact, there continues to be a growing increase of need for uranium. Do we make an estimate of what we need, and then we have never found ourselves in a situation of overestimating our requirements?

Dr. JOHNSON. That is very definitely so.

Senator JACKSON. I just wanted to say, Mr. Chairman, I think Mr. Johnson and the Commission are to be commended for the outstanding job they have done in the field of procurement of raw material. This is the very basis of the whole atomic energy expansion program, and I think what has happened on the Colorado Plateau alone is a great tribute to the people who have been directing this very important program.

Representative COLE. I am sure every member of the committee shares that view.

Chairman ANDERSON. I was going to say we have all been saying that in private and it is kind of a nice thing to have a chance to say it in public, Mr. Johnson.

Representative PRICE. Mr. Johnson, in answer to some of the questions, I do not know whether you touched on the basis under which you will let the leases on the Colorado Plateau.

Chairman ANDERSON. I think he covered that.

Representative PRICE. He did not touch on the factors. I am interested in determining those who obtained the existing leases.

Dr. JOHNSON. The important factors are experience in mining, preference being given to a year or two's operations of uranium mining, which is particularly true of the small operators that are inclined to get small leases; the capital that the applicant has available for the operation. That determines the particular type of lease for which he might be considered.

We have had a number of lessees out there who have probably had limited capital, something like $10,000, and they would be eligible for a lease that could be put into operation with that amount of money, operated by 3 or 4 men.

Some of the more recent leases were deeper ground instead of shallow openings. They now require up to five- or six-hundred-foot shafts, and expensive equipment may take $250,000 to open them up. It will require a capital, then, of that amount. Those are the very broad principles.

Representative PRICE. Is there any consideration given to a landowner who may be adjacent to some Government land that they are going to open up?

Dr. JOHNSON. There have been one or two instances when that has been the case by reason of the fact that the adjoining property had ready access underground to the ore deposit. There has also been a question of fractions involved.

Representative PRICE. I wonder if you could supply for the record a list of leaseholders who have five or more leases? Would there be a number of those persons or corporations, or partnerships that might hold five or more leases?

Dr. JOHNSON. I believe I am entirely correct in this, that there is no lessee that holds more than one lease. The differences, though, are in the size. That would be the acreage of an individual lease.

Representative PRICE. Do you permit subleasing?

Dr. JOHNSON. No, the leases cannot be assigned without permission of the Commission.

Representative PRICE. Has that permission ever been granted?

Dr. JOHNSON. No, sir.

Representative PRICE. You know of no exceptions to that?

Dr. JOHNSON. There is a situation out there where the United States Vanadium Co., which obtained a lease in connection with the expansion of its mill, has been using on its own property what is known in the Crippled Creek area as a split-check system. The company pays the miner for running the shaft, and doing the development work, and furnishes the equipment for the mine. Then when it comes to mining the ore, the miner, instead of getting wages or contract fee, gets a proportion of the value of the ore. The company furnishes equipment and other facilities, including the cost of the development and opening the property up.

Now, perhaps that could be called subleasing.

Representative PRICE. Has the Commission ever given its reason for denying a lease, or an explanation to the effect that the mills were producing their capacity, and they couldn't handle any more ore at the time?

Dr. JOHNSON. I directed our raw materials office in Colorado in the end of 1953 to discontinue leasing operations pending a study of the possible change in lease procedures, because at the time there had been a number of important discoveries of ore in that area, and ore was flowing to the mills faster than the mills could use the ore.

It takes but a few months, from 3 to 6 months to bring a mine into production, whereas it takes from 12 to 18 months to bring in a new mill. So we have been withholding leasing for something a little over a year now.

Representative PRICE. You are at the present time withholding leases?

Mr. JOHNSON. We have made no leases since the end of 1953.

Representative PRICE. For that reason?

Mr. JOHNSON. That is correct, sir.

Representative PRICE. That is all I have, Mr. Chairman.

Chairman ANDERSON. Senator Bricker.

Senator BRICKER. I have no further questions.

Chairman ANDERSON. Mr. Hinshaw.

Representative HINSHAW. Mr. Chairman, in response to an inquiry by Mr. Holifield a moment ago, which was to the effect did you know of any other mineral besides coal that has a guaranteed Government price, I note you did not include silver. Why not?

Representative HOLIFIELD. I could have included silver, and I could have included some other metals which are for defense purposes. I was directing my question mainly to the proposition which Dr. Johnson had said that after the defense needs were met, he recommended that there be an interim guaranteed price established which, as I understood, was longer than 7 years.

Representative HINSHAW. I just wanted to keep the gentleman from committing perjury by saying "No."

Representative HOLIFIELD. I do not think he is under oath.

Representative HINSHAW. On the other hand, there are other metals with a guaranteed price.

Representative HOLIFIELD. Monetary metals. I think tungsten is for defense purposes and stockpiling. I was directing my attention to that area spoken of in your statement here where you said this points to the deed for considering a long-range Government-buying policy, one that may be needed to cover a period between the defense market and a commercial market of reasonable size.

Mr. JOHNSON. The answer that I intended to give was that I knew of no other metal that had only one market and that was a Government market. I rather felt that gold had also a commercial market, and silver had a commercial market. I believe at the present time there is only one market for uranium, and that is the Government. The Government also has buying programs, as pointed out, for other metals, but there is also a commercial market.

Representative HINSHAW. I think the only market for gold is the Government under the law. I am not quite sure about silver, but there are many other metals which have a fixed price payable by the Government, that is, a maximum price.

Senator MILLIKIN. Mr. Chairman, I would like to suggest that the committee in executive session give rather early attention to the percentage of imports as against domestic production on uranium ore.

Chairman ANDERSON. Thank you, Senator. In addition to that, I want to say that the Subcommittee on Raw Materials will explore a great many of these things. But we did think in this hearing we ought to have a preliminary survey of this. We are very thankful to Mr. Johnson for it.

In the meeting previously Dr. Libby read the present status of the AEC power reactor technology program. If there is no objection from the committee, we will follow the same pattern and ask for some staff questions, and then allow individuals to come in with the understanding that they can do it any time. Mr. Allardice.

Mr. ALLARDICE. Dr. Libby, on the first page of your statement you say—

> It is expected that industrial organizations will gradually pick up the advanced technology of earlier periods and carry it into end-products on a risk-capital basis. As this transition occurs in reactor development, the Government's role is to push forward into still more advanced technology.

Do you give recognition to the role of industry in pushing forward frontiers, also, or is this totally a Government prerogative?

Dr. LIBBY. I hope that industry will play an increasingly important role in this development. Our problem in the development of atomic power is to get the technical people in the country to work on the problem and the Government has only a certain limited fraction of

these in its employ. It is a very small fraction. So we need to do everything we can to get the technical people who can contribute to the solution of the technological problems to work in this great task.

Mr. ALLARDICE. Doctor, are you familiar with the Joint Committee report of October 1951, which characterized the Commission's program as lacking in boldness in reactor development?

Dr. LIBBY. I remember reading it, Mr. Allardice, but I cannot remember all of the details. Yes; I think I can say I recall it.

Mr. ALLARDICE. Would you characterize the present program as bold?

Dr. LIBBY. I think the present program is bold. I can easily find features of it that might be bolder. But I think the present program is bold, and I think we aim to make it bolder.

Mr. ALLARDICE. Would you share the criticim which was voiced by an eminent physicist that the Commission's program has yet to produce a pile that did not surpass its design criteria in performance? Would you consider that a valid criticism of an exploratory development program, or would you take pride in it as the result of excellent people and good work?

Dr. LIBBY. I think that it is to a certain extent valid. There is another side to this coin, and that is that these reactors cost so very much money. It is a little bit difficult to spend millions and millions of the people's money on what you might call a real long shot, whereas you might make time in the long run by doing it, although it might be quite expensive. I think we are trying to follow an intermediate course here. In this 5-year reactor program, some of these reactors have quite a long way to go and others are fairly certain to work. So we are following a rather intermediate course.

Mr. ALLARDICE. In your opinion, would a Government directed program or a program directed by private incentives approach the reactor problem with more boldness? Which would approach it with more boldness?

Dr. LIBBY. It is very difficult for me to answer that question. This is such an extraordinarily different development. This development is so different from anything the world has ever seen before. We have very little experience to draw on. I think we will know better in a few months or a year or two. I am afraid I cannot really answer that question at this time.

Mr. ALLARDICE. In your discussion of the pressurized water reactor, you state that it will provide reliable cost data relative to construction. operation ,and maintenance of a large nuclear powerplant.

How was the construction and design contract awarded?

Dr. LIBBY. I will have to refer that to the General Manager.

Mr. NICHOLS. The construction and design. The Westinghouse Co. has responsibility for the reactor part, and we have subsequently selected in a process essentially of negotiation an architect-engineer.

Mr. ALLARDICE. Is that Stone & Webster?

Mr. NICHOLS. Yes.

Mr. ALLARDICE. There was no competitive bidding. It was a cost-plus contract?

Mr. NICHOLS. What we did was to analyze the propositions of the various contractors that were willing to enter into the work. Actually in this case Stone & Webster is working for either a zero or dollar

fee, as I recall. What we looked at primarily was the ability and the men they had ready to put on the job. It was selected by our normal processes of trying to get the best contractor for the job. But it is a cost-plus-fixed-fee. In this case it is either $1 or a zero.

Mr. ALLARDICE. Taking into consideration that this is a cost-plus contract with a selected contractor, and that the subcontractor is operating for a fee of $1, do you believe you will have reliable construction figures out of this?

Mr. NICHOLS. Yes; I believe we will. Again we are trying to make some time here. If we waited for Weshinghouse to get the complete design and let the thing out on a competitive bid, we would have the reactor done at a much later date than by going ahead this way.

Mr. ALLARDICE. You do believe that you will have reliable construction data to measure future economics of power against?

Mr. NICHOLS. We feel we will; yes, sir. It does not mean that this is the most economical pile reactor that you can build, but certainly the data we have will permit us to appraise later something that was unnecessary. In other words, if you found you exceeded certain safety requirements in this reactor, or the design exceeded expectations, you could reevaluate that, and get a new estimate of what a reactor would cost. Thate is what we mean by betting cost data. It is based on construction and operation. It does not necessarily mean this is the latest word.

Mr. ALLARDICE. Further on that same subtopic, under its contract with the Commission, Duquesne will furnish a site for the entire project, et cetera. Is this site subject to Government recapture in case the Government determines either not to operate the reactor or to operate it for some other purpose or to deliver steam to some other person?

Mr. NICHOLS. We are acquiring the land for the reactor itself. We have it under lease.

The site covers both the site of the reactor and the site of the adjoining powerplant. The steam generating equipment. Duquesne owns the site. However, they have leased to us the site where the reactor will be placed, because that will still be owned by the Government.

Representative HOLIFIELD. How long is the lease?

Mr. NICHOLS. I will have to get that.

Mr. ALLARDICE. Do you have an option to utilize the land, the terms of which are to be arrived at by mutual agreement upon termination of your relationship with Duquesne so you could use the reactor for other purposes?

Mr. NICHOLS. I don't remember the exact terms of the agreement. I would have to get that.

Mr. ALLARDICE. I wonder if you could supply it for the record?

Mr. NICHOLS. Yes, sir.

(The information referred to follows:)

SUMMARY OF DUQUESNE LEASE AGREEMENT

On November 3, 1954, the Commission entered into a definitive contract (term of 5 years following completion of construction) with the Duquesne Light Co. The contract provides, among other things, that the company will grant to the AEC a lease of the premises on which the nuclear portion of the PWR plant will be located, together with rights of ingress and egress. The lease was executed concurrently with the contract.

A summary of the provisions of the lease follows:

(1) For a consideration of $1, Duquesne leases to the AEC a tract of land of about 6 acres together with rights of ingress and egress and of access to the Ohio River. Included in the lease are improvements and property owned by the company and placed or constructed on the leased area.

(2) The lease extends from November 3, 1954, to March 17, 1994, unless sooner terminated.

(3) The Government has no obligation to pay rent for the property unless the contract expires without renewal or is sooner terminated and the lease continues in force. (NOTE.—This might occur if the Commission chose, after expiration or termination of the contract, to exercise its right to continue to use the property for the purpose of research and experimentation on reactors and reactor technology.) In such an event the Government shall pay yearly rental as described in (4) following.

(4) The rental for each annual period of occupancy subsequent to expiration or termination of the contract shall be in amount which will return to Duquesne the sum of—

(*a*) The straight line depreciation of the Duquesne-owned portion of the nuclear portion of the PWR plant at a 4 percent rate; and

(*b*) An amount computed at 6 percent of the company's original cost investment in such portion of the nuclear portion of the PWR plant.

(NOTE.—The Duquesne-owned portion of the nuclear plant refers to those facilities of the nuclear portion, such as concrete enclosures, buildings, etc., constructed under the Duquesne $5 million contribution and to which Duquesne, insofar as legally permissible under the Atomic Energy Act, will retain title.)

(5) The Government may terminate the lease at any time by giving the company 6 months' notice.

Representative HOLIFIELD. I would say that is a pretty important question. If the Government is going to spend in the neighborhood of 35 to 50 million dollars, they certainly should know whether they are spending it on somebody else's land with a short lease, or with a long lease, or with a right for recapture.

Mr. NICHOLS. I am sure that we have adequate provisions. I just don't remember the terms of the contract.

Mr. STRAUSS. I would think, Mr. Holifield, that the lease and agreement is in the file of the Joint Committee by transmision from the Commission.

Mr. ALLARDICE. It is, sir. We were asking for an interpretation.

Mr. NICHOLS. Mr. Davis tells me the lease runs for 50 years.

Mr. ALLARDICE. That is only when you operate with Duquesne, or is that if you terminate with Duquesne?

Mr. NICHOLS. We have the contract here. We can look it up. I don't keep in my head the terms of all the contracts we have.

Mr. ALLARDICE. In the sodium-graphite reactor with North American, Inc., you say that North American will provide $2½ million of the funds required.

How does this arrangement differ from the arrangements which you would entertain under your power demonstration reactor program?

Mr. NICHOLS. I would hope that under the power demonstration reactor program which we have not explained yet that we would essentially reverse the procedure. In the case of North American's contract for development, we are in effect running the job and taking the bulk of the responsibility and putting up the bulk of the money. In the power demonstration reactor program we would hope that the larger proportion of money is put up by private industry and we are assisting them by various types of research and development aid and by certain concessions, as will be outlined later.

Mr. ALLARDICE. Was the North American arrangement undertaken under the Atomic Energy Act of 1946 or the Atomic Energy Act of 1954?

Mr. NICHOLS. It was started under 1946.

Mr. ALLARDICE. The difference, as I understand it, in what you said between this arrangement and those under the power demonstration reactor programs is a matter of degree of government contribution.

Mr. NICHOLS. That is right. We are trying to shift a greater portion of the financial responsibility and the responsibility for design to private enterprise, rather than to Government taking that large proportion. In other words, as I stated the other day, we are trying to reverse the percentages. In other words, to have perhaps three-quarters of the expense borne by private industry and we contribute perhaps a quarter.

Mr. ALLARDICE. I am jumping ahead, but it ties to this. Could the power demonstration program have been undertaken without a change in the law?

Mr. NICHOLS. I don't think it could, no, sir.

Mr. ALLARDICE. Because industry would not be willing to put enough money in unless it had ownership?

Mr. NICHOLS. What we are doing here is that we would assume they would own the reactor, and we will be in effect making use of the terms of the 1954 act to make available the material. Then also the terms for buying material produced in the reactor. So we certainly needed the 1954 act in order to carry out this new program as it has been outlined or will be outlined.

Mr. ALLARDICE. Who will own the North American reactor when it is completed.

Mr. NICHOLS. The Government.

Mr. ALLARDICE. I note also in the North American reactor, the major components of the reactor and cooling system are out for competitive fixed-price bid. Is that same technique being used in the PWR where you want reliable cost data?

Mr. NICHOLS. Many parts of the PWR are out for fixed bids. Some cases involved the development contract. In some cases we have actually two pieces of equipment being developed to see which can come up with the better and cheaper. But we use wherever possible a competitive bid to get components. That we feel is a part of the program to develop an atomic industry, that is, component suppliers. We find people who have been in the boiler business are interested in picking up this component work, because they see this is a future business that may replace a present business. So we find them very much interested in getting into this new field. That is all part of our program of trying to encourage private industry to pick up and do on a competitive basis what we know is ultimately essential here if we are to really have a thriving power industry.

Mr. ALLARDICE. Could you estimate or provide for the record the amount of money involved in the PWR that will be spent through competitive bid?

Mr. NICHOLS. I could provide it for the record; yes, sir.

(The information referred to follows:)

It is estimated that approximately 50 percent of Government funds expended on this project will be under contracts awarded on a competitive bid basis.

Mr. ALLARDICE. Regarding the site, I find that we do not have the lease. We have the basic contract, but no lease.

On page 6 of the statement I note that facilities to develop, manufacture, and reprocess fuel elements containing plutonium are essential for the development of fast breeder reactor powerplants. The architect-engineering contract for a facility, to be located at Argonne to develop and manufacture such elements has been completed.

Is this an activity which might be done under license by private industry?

Mr. NICHOLS. That is a facility that the Director of the laboratory was most ardently requesting when I first came into the program. It is essentially so he can conduct development work. It is really a part of the laboratory. His basic argument for it was in regard to the breeder work.

Mr. ALLARDICE. You don't consider, then, that the building of this plant is in conflict with the intent of section 161 (m) which directs the Commission not to take actions which would discourage, or to constrain its actions to a degree not to limit, industrial development?

Mr. NICHOLS. No; although we would hope later that people could get into this type of thing. I think you should keep in mind that this particular plant is something that was considered urgent, and was put in last year's budget and was authorized shortly after we got the money.

Mr. ALLACDICE. Passing then to the HRE, No. 1 or 2, I am not sure which, fabrication has started on all major equipment. Is that by bid or by cost plus, and if so, who is doing the work?

Mr. NICHOLS. What page is that, sir?

Mr. ALLARDICE. Page 6, sir, at the bottom of the page.

Mr. DAVIS. Some of the components are being purchased on a competitive normal procurement basis. Others can be fabricated on a development basis, fixed fee.

Mr. NICHOLS. We find in these various reactors where you use one firm compared with another that one will do a greater degree of utilizing competitive bidding than another. We try to encourage them all to do it. However, when we contract with one of these big companies to carry on this type of work for us, we rely largely on their judgment as to what they can do by competitive bid, and what they feel they must do on a cost basis. You won't find complete consistency her except that we try to encourage them all wherever possible to use a competitive basis.

Mr. ALLARDICE. On page 9, under "Other reactor approaches," I note a contract has been placed with the Babcock & Wilcox Co. to study the Brookhaven data on the liquid metal fuel reactor, and in addition, the Dow Chemical Co. has undertaken a contract.

Mr. NICHOLS. These are Brookhaven laboratory subcontracts and really feasibility studies. We are just giving this newspaper announcement which I okayed before I came over here. It is a relatively small contract. We have been doing this in the past when the technical people in the laboratory have brought a design to the point where they feel they would like to get a little more industrial talent in on it.

They employ a company to make a feasibility study or modification of design. Based on that study, we will then determine what part that reactor should play in our program. That is essentially for information.

Mr. ALLARDICE. Would you say that the interest of these firms in the LMFR flowed out of the study teamwork?

Mr. NICHOLS. I don't know for certain in this case. I do know in the case of the first one, Babcock & Wilcox, I was informed that our staff considered that a very good contract, and undoubtedly Babcock & Wilcox felt that they would be willing to work here at practically no profit, if any, because it is the same type of thing as a study contract, where they are utilizing their people.

Mr. ALLARDICE. Would it be fair to say that this flows out of the Babcock & Wilcox interest which was engendered as a result of the study teamwork?

Mr. NICHOLS. Would you say that?

Mr. DAVIS. I think so.

Mr. ALLARDICE. At that point Babcock & Wilcox could have chosen to develop it itself, or take a contract from the Government as it has done here.

Mr. NICHOLS. That is right. This is largely a laboratory decision there as to how they felt they should go ahead with their own design. The AUI, I understand, desired to do it this way, where they essentially retain control of the results.

Chairman ANDERSON. Who desired it?

Mr. NICHOLS. Associate Universities, Inc. That is Brookhaven. It is a group of universities in the East that operate the Brookhaven laboratory for us. This is one of their designs that they have come up with, and this is the next step. It is a feasibility study.

Representative HOLIFIELD. That is a research and development contract.

Mr. NICHOLS. That is right. It is really less than that, sir. It is just a feasibility study taking research and development data, and making engineering studies and coming up with a report.

Mr. ALLARDICE. I am only using this as an example with reference to whether Babcock & Wilcox Co.'s work in the study team made them a prime contender for the selection of this contract.

Mr. NICHOLS. I would think so. It is also the way they develop their talent to where they are qualified to do this work.

Mr. ALLARDICE. Would the same go for Dow Chemical Co.?

Mr. NICHOLS. I believe so. They also were engaged in a study contract and have developed a group of people that understand the work.

On this type of thing I raised the same questions as you did, Mr. Allardice, why couldn't we get this all done by a study contract. We do have to judge each case on its merits and listen to the advice of the directors of the laboratory and how much control they want to have. In some of these laboratories they feel that if it goes completely to a study contract, they lose control of it, and they have no way of pushing it.

Mr. ALLARDICE. That would be even more so under a licensing system.

Mr. NICHOLS. Yes. I feel we need the combination of both of these. In other words, private enterprise going ahead, and the Government carrying forward its own program.

Chairman ANDERSON. Why does it worry you so when you lose control?

Mr. NICHOLS. I did not say I was worried. I said the laboratory directors are frequently worried if they lose control. It is like pulling a baby out of the arms of a mother. When they have a good idea, they want to be certain it will carry on. It is a little problem in human psychology of how long do you let a research and development laboratory carry the ball, as I call it, and when you try to bring it out from the laboratory either as we have done in the PWR under Government supervision and control, as in the case of Westinghouse, or as we are offering in this power demonstration reactor program, the opportunity for industry to come in and pick these out as they see fit. In that case we expect to essentially surrender control. We are following both courses, Mr. Chairman. We still feel that we want to carry forward our basic Government reactor program in the research and development stage until we are certain that private enterprise has picked up the load where we don't want a drop in progress. In other words, we are trying to supplement the 5-year program with greater industrial participation in the interest of making speed. It is part of what Dr. Libby described here as to how we make it bolder.

Mr. ALLARDICE. Jumping to page 14, the large ship reactor, what is the relationship between the PWR and the LSR?

Mr. STRAUSS. Could that be left for an executive session?

Chairman ANDERSON. Yes, indeed, Mr. Chairman.

Mr. NICHOLS. I am not too sure where you border on this one.

Chairman ANDERSON. When we are in doubt we will take it up in executive session.

Mr. STRAUSS. They are both pressurized water reactors. They have that in common.

Representative HOLIFIELD. Could I ask this question, Mr. Chairman. If you want to carry this into executive session for any reason, it will be all right with me. We have $200 million allotted for this program. Is there a report as to how much of that is committed and how much is not yet committed for these different programs?

Mr. NICHOLS. Yes, certainly in our budget defense we have that type of information.

Representative HOLIFIELD. You can furnish that. Are there any of those programs being slowed up because of lack of funds at this time?

(The information referred to follows:)

5-year power program costs

[Millions of dollars]

	Total estimated cost	Fiscal year 1954 actual costs	Fiscal year 1955 costs through Dec. 31, 1955	Total to date (through Dec. 31, 1955)	Estimated balance, fiscal year 1955, based on mid-year review request
1. Pressurized water reactor:					
Research and development	45	7.7	4.2	11.9	5.3
Construction	40		.2	.2	6.3
Total	85	7.7	4.4	12.1	11.6
2. Boiling water reactor:					
Research and development	16	2.4	1.6	4.0	2.2
Construction	1				.2
Total	17	2.4	1.6	4.0	2.4
3. Sodium graphite reactor:					
Research and development	9.5	1.4	1.0	2.4	1.8
Equipment	.5				.1
Total	10.0	1.4	1.0	2.4	1.9
4. Homogeneous reactor:					
Research and development	35.1	3.9	3.1	7.0	3.5
Construction	11.9				.3
Total	47.0	3.9	3.1	7.0	3.8
5. Fast breeder reactor:					
Research and development	22.3	3.4	1.5	4.9	2.2
Construction	17.7		.2	.2	.5
Total	40.0	3.4	1.7	5.1	2.7
Total 5-year program:					
Research and development	127.9	18.8	11.4	30.2	15.0
Construction	70.6		.4	.4	7.3
Equipment	.5				.1
Total	199.0	18.8	11.8	30.6	22.4

Mr. NICHOLS. I don't believe so. What we have been trying to do, Mr. Holifield, is this: Last year at the suggestion of this committee we formulated the 5-year program. We have subsequently tried to give that another shot in the arm by the budget for this next year of making it go a little faster and the Commission has supplemented it with a request for funds that may be utilized either to further increase the 5-year program or on this power development reactor program.

We feel we are pushing this thing forward. You have to accelerate as you develop organizations and develop talent. I don't know right now of anything lacking in funds.

Representative HOLIFIELD. You can assure this committee that these separate programs are going forward either on schedule or ahead of schedule, can you?

Mr. NICHOLS. I would say some of them are running into snags. But generally it is progressing approximately as we had hoped.

Representative HOLIFIELD. It is the Commission's objective to make it go as fast as possible?

Mr. NICHOLS. Yes, sir; it certainly is the Commission's objective to move this forward as fast as we can. We have that well documented that it is the administration's policy to push forward on the reactor development and power development as fast as we can.

Representative HOLIFIELD. Are any of these snags due to loss of key scientific or engineering or management personnel?

Mr. NICHOLS. No, I am thinking of such things as when you put something in a reactor, and you suddenly discover you have more corrosion than you anticipated.

Representative HOLIFIELD. You are thinking of technical difficulties rather than personnel difficulties?

Mr. NICHOLS. Yes, sir. We do have other places where we found technically it is easier than we thought. I think we just notified the committee of one case where we have just added two more million dollars to one program—which I don't desire to identify here—because we find we can move faster. We constantly watch these programs and if it looks as though we can move faster, we try to find the funds and make them available.

Dr. LIBBY. In this connection, Mr. Holifield, the HRE No. 2 has had its goal tripled since the report in February. The aim now is 3,000 kilowatts of electric energy equivalent whereas they had one in February.

Representative HOLIFIELD. We will get a complete report on each one of these programs, the amount of money committed, the amount of money spent, and the status of them, in executive session.

Dr. LIBBY. As much as you wish.

Chairman ANDERSON. We also have a Subcommittee on Reactor Development which will inquire into this as carefully as possible.

Mr. STRAUSS. And you have a semiannual report, Mr. Holifield, which goes even into the classified items in that much detail, and there is one due you very shortly.

Mr. NICHOLS. Part of your answer, Mr. Holifield, in regard to how much is committed, the 5-year program is on a year-to-year appropriation basis. We don't have the money for all of it. We set out an idea of what we thought it was going to cost, and ask for the money on a year-to-year basis. I would assume before we finish the 5 years it will cost more than the estimates. They always do.

Representative HOLIFIELD. More than the $200 million?

Mr. NICHOLS. I would think so, if you continue to use the policy that you try to push these things as the state of the art warrants. That was an estimate when we made up the program last year. I would hope we can spend more money—not with the idea that you are trying to increase costs, but I feel we will have a long way to go. In other words, this 5-year program is not the end. The faster we develop this thing, in the long run we are money ahead.

Representative HOLIFIELD. I think so, too.

Mr. ALLARDICE. Passing to the Army package power reactor, 94 firms had interest and 33 submitted bids. Of the 33 I understand from your testimony the spread was somewhere around $2 million to $6.9 million.

Mr. NICHOLS. Yes, sir.

Mr. ALLARDICE. Where did the average bid center?

Mr. DAVIS. Most of them were between three and four million dollars. There were 18 bids.

Mr. ALLARDICE. 18 were between three and four million dollars?

Mr. DAVIS. No. There were 18 total bids. I would say the majority of these fell in the range of three to four million dollars.

Mr. NICHOLS. We would be glad to give you the bid prices in executive session. We don't like to give the bid prices in public.

Mr. ALLARDICE. You have supplied them to us. What was the Corps of Engineers estimate of the Army package power reactor?

Mr. DAVIS. The estimate was prepared by Oak Ridge and was about $4 million.

Mr. ALLARDICE. The estimate prepared by Oak Ridge was $4 million.

Mr. DAVIS. Yes.

Mr. ALLARDICE. The estimate accepted was $2,096,753.

Mr. NICHOLS. Yes, sir.

Mr. ALLARDICE. To what do you attribute the difference between the low bid and your estimate?

Mr. NICHOLS. I personally feel that the company bidding on this is taking some loss on the initial reactor in the hopes that there will be future business. That is frequently done by private enterprise. Instead of giving the price of the first one, they may give the price at which they hope to produce successive models. I raised that issue with the Commission and we felt it was not necessary to worry as to whether a company made a profit or took a loss, as long as we let this contract out by bidding methods.

Chairman ANDERSON. If they came crying to you afterwards and said, "We lost money," you wouldn't feel any obligation to help them?

Mr. NICHOLS. I would not feel any obligation to help them.

Chairman ANDERSON. You know the story of the nickel cadmium battery very well.

Mr. NICHOLS. That is not as firm a contract as this, sir. I think they are in a bad position to come to us for any help.

Mr. ALLARDICE. Would you categorize as valid statements which have been made that the successful bidder on this contract bought it by bidding under?

Mr. NICHOLS. I would say there is some basis for such a statement. I don't think I would have ever used it that way. I think every low bidder has the question of how much is he playing on a particular bid, and how much is he playing for the future.

Representative COLE. Mr. Chairman, I would like to inquire was that expression "by bidding under" a part of the statement?

Mr. ALLARDICE. Yes.

Representative COLE. There are other ways of buying a contract than bidding under. I want to be sure that the other inference was not there.

Mr. NICHOLS. I only understood the one inference in my answer.

Mr. ALLARDICE. That is all I have, sir.

Chairman ANDERSON. Mr. Hamilton had a couple of questions, and then we will go on with the members, if there is no objection.

Mr. HAMILTON. I think most of the things I had in mind have already been covered by Mr. Allardice. I would like to ask a couple.

One would be to clarify the public record of some controversy which has appeared in print over the matter of the amortization certificate

which was granted to the Duquesne portion of the investment on the Shippingport reactor. Could you clarify that?

Mr. STRAUSS. Mr. Chairman, we do not have any information on that at the moment, but we hope to have it to submit for the record tomorrow.

Mr. NICHOLS. Some of it has not been completed.

Mr. STRAUSS. As I stated yesterday, this occurred after the contract had been completed between the Commission and the contractor.

Mr. HAMILTON. We understand that. It is our understanding that it was granted under an executive order for all utility plants.

Mr. STRAUSS. That is my understanding.

Mr. NICHOLS. We would like to get the complete story and give it to you.

(The information referred to will appear in the appendix to pt. 3.)

Mr. HAMILTON. I wonder if you could give us some idea of the extent to which the success of the boiling water reactors so far suggest that there is strong assurance that when the next unit and the units beyond that are built, they will probably be successful. Therefore, going back to Dr. Libby's earlier comment about not wanting to go too fast, whether we are warranted in taking a step which is somewhat short of what the scientific people who are engaged in the program sometimes have implied.

Mr. NICHOLS. My personal philosophy on this type of thing is that what we have in the reactor field are 5 or 6 or more approaches. I don't think anyone could say at any one time, looking in his crystal ball, with a certainty that this particular reactor is going to come out ahead.

My own philosophy on this type of research and development is that we should be prepared as we see any one of these approaches look promising, to back it to the hilt as far as the state of the art for that particular approach warrants. We just let whatever one wins win. I think that is the only way we can approach this thing and not have a lot of opinions, and then worry about changing them. Certainly the success we have had in the boiling reactor has given us a lot of assurance that we ought to support it more ardently, which we are doing.

Mr. HAMILTON. On that same point, then, if the success of the boiling water reactor experiment so far suggests that this is a very profitable line of research, and it also is one in which industry firms are showing increasing interest, has the Commission given any consideration to the point at which a research project looks sufficiently promising and attracts sufficient industrial attention so that the commission might put its attention on other projects less promising, and allow the industrial people to take full responsibility?

Mr. NICHOLS. If some industrial group came up under our program for the power demonstration reactor program, which took the responsibility for the boiling water reactor, we would determine how much we would support that group, and if we had funds left over, we might pick up some other approach.

Mr. HAMILTON. Does the award of the contract to Allis Chalmers at the same time with the demonstration power reactor program have any confusion here?

Mr. NICHOLS. No; I don't think so. That is just a small step. It is a relatively small reactor. Again this is a case where the laboratory

director thought he was ready to go. We agreed with him and permitted him to go ahead on the way he felt he could make the greatest progress.

Representative HOLIFIELD. May I interrupt Mr. Hamilton for a question at this point, Mr. Chairman? I was interested in the philosophy you expressed. I heartily approve it. I would like to know at this time whether that philosophy is shared by Mr. Strauss, Dr. Libby and Mr. Murray, of pushing as rapidly as possible on all the reactors.

Mr. STRAUSS. It is certainly shared by me.

Mr. MURRAY. Yes.

Dr. LIBBY. Yes.

Mr. STRAUSS. It parallels the philosophy of the Corps of Engineers in attacking the separation process in the early days of the atomic energy program. They moved ahead on a number of fronts which after a good deal of expenditure of money on the others proved to be the best.

Representative HOLIFIELD. I want to compliment you on the vigorous pushing ahead on these reactors, because I believe we can't afford to let this thing lag. I think the Government has to take the initiative in pushing ahead on it with or without industrial participation.

Mr. NICHOLS. I agree with you heartily on that.

Mr. HAMILTON. Somewhat in the same connection, I wonder if the Commission could tell us whether there has been any Commission discussion in recent months as to whether the relative rate of progress in the heterogeneous field of reactors as compared to the homogeneous field suggests that it might be desirable to hold back on the heterogeneous and inherently high cost systems, and try to put more effort faster on the homogeneous to find out as soon as possible whether that is a profitable line of inquiry.

Mr. NICHOLS. I would say a better approach than the one I have been using is to prod the people on the homogeneous to make faster progress. I never believe in holding back anything in the hopes that something else can catch up with it. I think another way of quoting one of my bosses, K. T. Keller, in the guided missile project, it is like breeding race horses. You don't know how many to breed to get a Kentucky Derby winner. You train them and when it comes time for the race, you stick the one that has the best chance to win. But you don't decide at the time you breed a stallion to a mare that it is going to be a derby winner. You hope you have one. You have to raise several of them and take good care of them to get a winner.

Mr. HAMILTON. They are not like horses. At some point you get an idea what the foal is going to look like.

Mr. NICHOLS. That is when you decide you are going to push a particular type of reactor or throw it to one side. But as long as they are advancing, and the art is advancing to where it is promising, you should put in the money at the rate your organization, the talent and state of art permit. You cannot set budgets 5 years ahead on that basis. Yu have to set them year by year, and constantly reevaluate them.

Mr. HAMILTON. One final question. The Commission operates two principal applied laboratories, one at Schenectady and one at Pittsburgh, which are operated by the principal equipment manufacturers

in the country, both of which have set up equipment development divisions in the atomic field. Can you give me any idea how the Commission is policing the inherent conflict of interest in having the principal equipment manufacturers running the Commission laboratories at the same time they are trying to establish themselves as the principal people in these fields?

Mr. NICHOLS. We have controls. The last time I was out in Pittsburgh, I dug into that. I cannot look into all of these.

For example, for the development of a pump for PWR, I believe they have three competitive contracts. One of them is Westinghouse. In other words, Westinghouse is trying to do a job, and there are two other companies.

So that is one way we do it. We watch and supervise a contractor to see that he doesn't favor only his own product. They recognize that all these things are subject to scrutiny both by ourselves and other Government agencies, including this committee, so that they feel they have to do a fair job on this. I think they are.

Mr. HAMILTON. More than just on contracts and equipment, how about the transfers of people back and forth between the private portions of the laboratories, and the portions they are operating under contract?

Mr. NICHOLS. There is some of that that goes on in our work. We are presently considering that in the Commission. How do we control it? We have not formed a definite policy because in the future there will be much more. My own experience has been with the Department of Defense. For example, in an airplane industry, in one of the big plants they pay very little attention if one man is shifting from Government work to private work. The main thing is that your auditors are in there to see that the time is properly charged for. I think we have to allow that. But it is one of the things which we presently have before the Commission to try to resolve, and put some better guide lines on it. To date the Commission has leaned over backward in trying to separate the two. I personally feel we must allow greater freedom in that regard.

Mr. HAMILTON. I was not speaking so much to the Government cost of the matter as I was to the similarity of problems which sometimes arise between the private projects they are pursuing and the Government projects.

Mr. NICHOLS. You are talking about key talent here.

Mr. HAMILTON. Yes.

Mr. NICHOLS. I think you have to permit that interchange if you are going to build a healthy industry here. It has been done in other Government work. I have watched it in the Department of Defense. You cannot expect a man to solely confine his activities to Government or solely to private projects. You have to allow a reasonable interchange. One of the fundamental principles we will insist upon is that our work does not suffer. If we are paying a company and they have a contract on the basis they are making certain people available, we don't want them then to use them 90 percent of their time on their work.

Mr. HAMILTON. Licensees' key personnel in this area will be allowed to come into Commission applied laboratories?

Mr. NICHOLS. We have people coming now into our Government laboratories. I cannot discuss this fully because it is one of the things we are presently working on. It is a problem. We recognize it, and we want to get a fair solution that is fair to the company and the Government, and at the same time makes the work go fastest.

Mr. HAMILTON. Are you doing some long-range thinking of any kind by the ultimate disposition or integration of the Commission's own applied laboratories in the total industry?

Mr. NICHOLS. Occasionally the idea has come up, should we sell one. We have not yet formulated any program which indicates that we feel we are at the point we should sell these laboratories. Perhaps at some time in the future we should consider that type of thing we should be absolutely certain this program is moving forward. If industry picks this up where the Government effort can drop, and we can transfer laboratories, I think we should consider that. I don't think you should anticipate it, and take a chance on the whole thing slumping because nobody has the ball.

Chairman ANDERSON. Are there any questions from members of the committee? If not, I want to ask this. You recall the Johnson amendment which was before the Senate in which Senator Johnson of Colorado hoped that it might be possible for the Atomic Energy Commission to build some of these plants, too, and it was changed in the conference report, because there was a provision that said that the Commission is authorized and directed to conduct through its own facilities, activities and studies of the types specified in section 31. Among the types specified in section 31 was the generation of usable energy, the demonstration of the practical value of utilization or production facilities for industrial and commercial purposes.

Has the Commission moved toward implementing that direction looking toward the generation of energy in its own plants?

Mr. NICHOLS. One of the things we are considering—it has not reached Commission stage, it has not even reached Washington—in Oak Ridge some of the technical people feel that their reactor is getting to the point where if it is not picked up by private enterprise, maybe the Government should build it there and use the power. Again I think we should play this by ear. If we can get outside support to build something, fine. If one of the good promising reactors does not get outside support, and the Government thinks it is worthwhile, we push it.

Chairman ANDERSON. But if these people at Oak Ridge are anxious to go ahead——

Mr. NICHOLS. They are beginning to build up that enthusiasm. That is what you need. When you go down and subject them to a scrutiny of questions where I can reserve the procedure here, if they are still ardent and for it, we would be interested in finding some way to push it forward. You always have to watch when you have the salesmanship campaign as distinguished from when they are ready to say we are certain we will get results.

Representative HOLIFIELD. But you do need some additional energy at Oak Ridge.

Chairman ANDERSON. We will quickly pass to item 6, the power demonstration reactor program.

Mr. NICHOLS. Thank you, Mr. Chairman.

Mr. STRAUSS. Mr. Chairman, Mr. Nichols will present this paper.

Mr. NICHOLS. I believe you all have a copy of section VI, the power demonstration reactor program.

An important objective of the Atomic Energy Commission is to develop one or more of the several types of reactor systems under active consideration to the point where it is economically competitive with conventional power plants. Considerable progress in attaining this goal is being made through the experimental reactor program (including the PWR) and the advanced engineering program.

These programs are concerned primarily with the development of basis scientific and engineering technology and the determination of engineering feasibility through the operation of experimental reactors. The Commission has concluded that at the present state of development the prospects for economic nuclear power are sufficiently bright so that an attempt should be made to demonstrate the production of power from reasonably large-scale reactors. The Commission has further concluded that it will appreciably accelerate the achievement of economic nuclear power if the principal financial and technical responsibility for the projects is accepted by industry.

There will be additional advantages. Industrial groups interested in the vital steps of fuel element fabrication, chemical processing, waste disposal, etc., will have an opportunity to begin to carry out these operations on an industrial scale.

Equipment suppliers will likewise be afforded this same opportunity. Further, such projects should go far to train engineers and management and to place power reactors development on a more nearly industrial basis.

Since it is presently true that nuclear power is not competitive in cost with conventional power, it is recognized that some AEC assistance will be necessary. To provide such assistance the Commission has set up a Power Demonstration Reactor Program. Under this program interested persons have until April 1, 1955, to file with the Commission their proposals for the private development, construction, and operation of power demonstration reactors. If responses are favorable and effective, subsequent dates may be established by the Commission for receiving additional proposals.

To carry on their projects persons or firms making acceptable proposals must qualify as licensees under the provisions of the Atomic Energy Act of 1954.

The Commission has announced that within the limits of available funds, it will consider providing to the makers of acceptable proposals the following kinds of cooperation and assistance: A waiver of the charge that the licensee would otherwise have to pay for the use of special nuclear material or source material furnished by AEC; performance in AEC laboratories and test facilities without charge to licensees of certain mutually agreed upon research and development work; and financial assistance under appropriate research and development contracts.

The waiver of charges for use of source and special nuclear material for fuel is intended to decrease a prospective sponsor's capital needs, particularly in view of the fact that capital requirements for demonstration power plants, exclusive of inventory, appear higher than for conventional plants. Although it may be that no charge will be made for the use of material——

Chairman ANDERSON. Mr. Nichols, I believe you read the word "use," whereas the copy of your statement that I have has the word "loan."

Mr. NICHOLS. Yes, sir. I made that correction since the copies were distributed to the committee. I did that in deference to Mr. Cole's suggestion of the other day.

Representative COLE. That does not entirely carry out the suggestion I had in mind. The point was that you have no intention of disposing of title and ownership.

Mr. NICHOLS. We have none. We were looking for a word to identify that. Although it may be that no charge will be made for the loan of material, it is nevertheless planned to charge for burnup and other costs, including separation and recovery. The basis of these charges will be agreed upon in advance. The amount of special nuclear material covered by this type of assistance will also be specified and agreed upon in advance.

The research and development work to be performed in Commission facilities for participants in the program will be defined in advance as to nature, and scope, and cost. The participant will be required to conform to adequate patent and reporting requirements.

The Commission also will consider entering into research and development contracts under section 31a of the act for the technical and economic information resulting from development, construction, and operation of power demonstration reactors by contractors. The amounts to be paid by AEC under the contracts will be fixed in advance and may be used for development, fabrication, and experimental operation. Information derived from operations under the contracts will be made available by AEC to the maximum extent practicable to the entire technical public working on reactor development, with resultant benefit to the progress of the entire nuclear power program.

Each participant will be required to comply with the licensing requirements of the act and will, of course, receive the benefit of the Commission's pricing determinations including the 7-year guaranty of prices to be paid for special nuclear materials which he may produce.

In evaluating individual proposals, the Commission will employ the following criteria:

1. Probable contribution of the proposed project toward achieving economically competitive nuclear power;
2. Cost to AEC in funds and materials;
3. Financial risk to be assumed by the maker of the proposal;
4. Competence and responsibility of the maker of the proposal;
5. Assurance given by the maker of the proposal against abandonment of the project.

Those proposals qualifying as acceptable under these criteria will be considered on a competitive basis within the limits of funds and materials available.

It must be recognized that the form of assistance which the Government offers to stimulate construction of power demonstration reactors can have a significant influence on the types of reactors which will be built as a result of the program. Since economic civilian power is the primary objective of the program, the assistance must be of

such form as to encourage development of reactor plants with characteristics important to eventual production of minimum cost nuclear power.

There are certain basic conflicts, for example, between reactor specifications which may be desirable for high materials production and those which are desirable for low-cost power production. One simple illustration of this conflict may be apparent from the fact that once new fissionable material is formed in a reactor it also can be destroyed and the net rate of production of the new material decreases with fuel exposure. Thus, if large revenues are expected from sale of material, relatively short fuel cycles are satisfactory. On the other hand, minimum cost power in a "power only" economy requires long fuel cycles in order that costs of fabrication, processing, and handling the fuel will not be large in terms of mills per killowatt hour of power produced by the plant. There are other conflicts of this type and the specific reactor design will always be aimed at maximum revenue whether the source of revenue be power or material. The pricing policy and power demonstration power reactor program approved by the Commission provide a balance of probable sources of revenue from such projects which we hope is sufficient to stimulate groups outside the AEC to enter the power reactor field with projects helpful to early realization of economically competitive civilian nuclear power.

The invitation to industry to submit proposals for construction of power demonstration reactor plans is an important part of the overall civilian power reactor program. Except for the pressurized water reactor the AEC reactor projects under the Power Reactor Technology Program are on a small scale and of relatively low total cost. On the other hand, power demonstration reactor plants will be of a generally larger size primarily to furnish data on operation and components engineering that can be obtained only from large-scale units. Furthermore, the Power Demonstration Reactor Program may include concepts other than or variations upon the reactor designs represented by the Power Reactor Technology Program.

As already indicated, the ability of private industry to build power reactors will depend upon its ability to acquire liability insurance in sufficient amounts. A solution to this problem is not now in sight. Despite the reactor safety record to date, private companies are understandably unwilling to assume the risk of third party liability without adequate insurance. Apparently the insurance industry is not in a position to underwrite these kinds of risks in the amounts which the reactor builders will require.

In addition, as we have also previously mentioned, the 7-year limitation on the Commission's authority to guarantee the price which it can pay for special nuclear material produced in privately owned reactors may substantially interfere with the financing of these projects. Actually, taking into account the approximately 3 years which will be needed to build a plant, the owners of the reactors will initially get the benefits of the guaranty only for approximately 4 years production.

Chairman ANDERSON. We have a great many questions on this, probably. This is the very essence of this whole thing. The questions will be developed by Mr. Allardice initially.

Briefly, again to repeat it to you, our concern has been that you are not going to use the licensing device, apparently. You are going to contracts. You are going to get into agreements of various kinds, but you are not going to license.

I notice on the bottom of page 3:

Each participant will be required to comply with the licensing requirements of the act.

You should have added in parenthesis "but will never get a license."

Mr. NICHOLS. They will get a license. They will get a license under section 104.

Chairman ANDERSON. We hope. That is what we are trying to develop, as to what your good intentions are.

Mr. NICHOLS. Our good intentions are to issue a license under this type of program under section 104. We have given great consideration as to how that license under 104 could later be converted to 103. If someone came up, as a result of this invitation for proposals, and said, "We will take the whole expense of this," I see no reason why we could not license them under 104.

Chairman ANDERSON. I do not, either.

Mr. NICHOLS. And we don't need a contract.

Chairman ANDERSON. I just wanted to say in a general way that is what we had in mind. Again I say that I thought Mr. Cole, while I am not trying to associate him with my ideas on this, in his Detroit speech made a fine speech because he hit on that very problem that might develop where we might not have the free play of American enterprise.

Mr. NICHOLS. I was commenting this morning, sir, there is certainly one thing that is clear that we have arrived at from the line of questioning. The committee is showing us unanimously that we should get on at a faster rate with the licensing. For that reason I left Mr. Price at home and told him to work on it.

Chairman ANDERSON. Because you are going to be here all next week while private industry is here, and steadily thereafter. Maybe our present impressions are not warranted. I am not trying to say. But it seems to be the thought in everybody's mind that on every possible occasion we should stress the desirability of proceeding under these licenses.

Mr. NICHOLS. The intention here was that we would be licensing under 104 for this type of program. Mr. Mitchell says there are three kinds of licenses here involved.

Representative COLE. I wish you would have Mr. Mitchell explain that. I am baffled about the way you are going on this power-development program under the law.

Mr. MITCHELL. Mr. Chairman, this power-development program would involve three types of licenses. The industrial concern would have to have a facility license to own and operate the reactor. It will have to have a special nuclear materials license in order to get the material. Presumably, the operator of the reactor will have to have an operator's license. We contemplate all three types here.

Representative COLE. Will you explain what is the effect of section 169 which prohibits the use of Commission money in any license under 104?

Mr. MITCHELL. Mr. Cole, we contemplate using section 31 by way of making a research assistance contract, and then as to waiver of charges, we look to section 53.

Representative COLE. I don't dispute your justification in taking that route. But will you not agree that it might tend to circumvent the effect of 169 by indirectly giving financial assistance to a licensee through a research contract?

Mr. MITCHELL. Sir, it seems to me that 169 specifically contemplates this; 169 reads:

> No funds of the Commission shall be employed in the construction or operation of facilities licensed under sections 103 or 104 except under contract or other arrangement entered into pursuant to section 31.

That is precisely what we contemplate doing.

Representative COLE. We at no time said that no Commission funds should go into a licensee of a research reactor under 104, and at the same time said it will be all right for you to put money in there.

Mr. MITCHELL. It says "except pursuant to section 169."

Representative COLE. We contemplated that the Commission should build its own reactors and use funds for that, but public funds should not be used for a licensee in a research reactor.

Mr. NICHOLS. What we are trying to do here, sir, is to have the license cover the construction under 104. We would insist on a parallel contract where we would be doing research for them, and we would also be making a contract with those people to be utilizing that facility for research development. We had a great deal of thought as to how to word the exact statement. It is on page 3. Under 31 (a) we say the amounts to be paid by the AEC under contracts will be fixed in advance, and may be used for development, fabrication, and experimental operation. We would not expect to put these funds for brick and mortar and things of that type.

Representative COLE. Will you not agree that the procedure you have determined to follow is tantamount to a subsidy of the project?

Mr. NICHOLS. You could call it a subsidy in the form of research and development to get them over the hump of a development program. If we get offers that don't require any assistance on a competitive basis they would be the ones granted the license.

Representative HOLIFIELD. If the gentleman will yield, the compensation as far as the Government is concerned is that such findings as occur under that contract are available to all other private enterprises.

Mr. NICHOLS. That is the intent here, sir.

Representative HOLIFIELD. You are no more subsidizing in a research and development contract which later turns into a commercial license use than you would be any other research and development contract, the knowledge of which is made available to all of industry.

Mr. NICHOLS. We would assume here that during the initial phase we would give them research and development assistance. But after you had that initial phase, and they wanted to convert this to a continuing power project, it has to be done under 103 without continuing assistance.

Representative HOLIFIELD. In other words, this is a recognition that the art has not gotten to the point where it is so fully developed that

industry can go it alone, and during this interim period where research and development and further advancement of these experimental projects are concerned, it is the Government's duty to go ahead and develop and make available to all industry its findings.

Mr. NICHOLS. We had felt so. In other words, in our talks to various companies—and much of this I did personally, I talked with the people that may come up with proposals—none of them felt that the state of the art was yet ready where they could completely finance a research and development reactor of any reasonable size. They felt that if we could find some way to assist them on research and development—that is, just one of the ways, a contract under 31 (b), or we felt we could say we would contract with them to do certain work in a Government laboratory at our expense to assist them—and the third form was in addition to the fuel price which they can anticipate for all time, subject to it going up and down after 7 years, during the initial period we also have set in our pricing schedule a slight increase over the fuel price which has taken into account the fact that we can use some of this material for weapons. Those are the three forms in the initial period which might make a reactor such as this economic. Whereas after you go over the research and development period, we would hope that the state of the art in the development of fuel rods—one of the things is how long do they last, if they last so many hours, the cost is so much per kilowatt, if they last 10 times as long, the cost goes down—we would hope in the 5 or 6 years it takes for development, that they would make advances in the fuel roads to where at the end they would have a reactor which they could continue to operate and sell power on an economic basis. If they don't, they have lost.

Chairman ANDERSON. I think, General Nichols, that it is going to be very important that we try to develop that difference of opinion that seems to exist here as to whether you regard this as the real interpretation of the law, or whether you recognize that what was written in here at the tail end of this was an escape clause to let you go make a research contract.

When you start paying the cost of these plants, you are making a subterfuge of what Mr. Cole and others thought was the purpose of the law. You are not trying to find out if industry is going ahead. You are saying to industry, "Don't put up your own money, because if you just wait, we will come along and give you part of it."

Mr. NICHOLS. We are not saying that, sir.

Chairman ANDERSON. Why not give them a chance to find out if they do want to contribute.

Mr. NICHOLS. We feel we are. That is why we feel we need to set a date, and why we need to take this on a competitive basis. As in the package power reactor, the expression was used. "Did they buy their way in?" If industry is ready to pick up the whole financial burden, if they recognize this on a competitive basis, the amount of additional support we have to give may decrease to zero, and in that case it becomes a straight 104 license.

Chairman ANDERSON. Why not try it on that basis before you start offering this money?

Mr. NICHOLS. Our thought was that it was not ready.

Chairman ANDERSON. I realize that was you impression. You did not give it a chance to find out if it was ready. You set up a selective

subsidy in a contract in the beginning, and said which would you like better, for us to give you all the money or put up some of it yourself. What do you suppose the answer will be?

Mr. NICHOLS. I believe that if anyone feels this is right they will come up with a competitive offer. They are sure to win.

Chairman ANDERSON. What do they win? They win the right to put all their money, while the next firm has part of the money put by the Government. What sort of winning is that?

Mr. NICHOLS. One of the reasons for a commission is to make this type of evaluation. I as General Manager have recommended it to the Commission. I think they have backed me on this particular appraisal of what the situation is today.

Chairman ANDERSON. Remember that the law has something to do with it.

Mr. NICHOLS. We think we are complying with the law, sir.

Chairman ANDERSON. You are complying with the loophole that was left in the law purposely.

Mr. NICHOLS. We had the overall objective of how do we move on with the work. We thought this was the best way to do it.

Chairman ANDERSON. You are saying that the loophole was the real purpose.

Representative HOLIFIELD. I just want to say that the element of competition will come in on each one of the power reactors when that is offered. It is at that point where the competition comes in to build it, as I understand. Your assurance to the committee is that if someone comes in and says we will put up 100 percent of the money, they will get the job.

Mr. NICHOLS. I think they will.

Representative HOLIFIELD. If they are qualified.

Mr. NICHOLS. If they are qualified.

Representative HOLIFIELD. That is where the safety is for not using loophole. But if no company comes forward on any one of the types and says we will take that by ourselves, then it is a matter of the Government stepping in and utilizing this clause.

Representative COLE. Under 31 (a) and having no connection with the license.

Representative HOLIFIELD. That is not the way we wrote the law.

Senator GORE. Mr. Chairman, I found this extremely interesting. I think it goes to the crux of the type of development we are to have and the time in which we are to have it. General Nichols has given an enlightening statement, but as General Manager he is soon to depart. The real policymakers in this field are the three Commissioners before us. For one member of the committee, I would like to hear each of the Commissioners on this. I know it is past 4:30 now, and I do not insist on it now, but this is so important I would like to hear the Commissioners testify to this particular point.

Chairman ANDERSON. I think it would be useful to have subsequent statements, if need be, but I do think this point which Congressman Cole has raised, and which others have raised, is a very important one. If nothing else comes out of these hearings, I hope we will settle that point as to whether we are going to try to go ahead under licenses where the Government does not have to be a partner and hence able to direct this or whether they are going to let private enterprise have a shot at it first.

Why not try them first? Then if nobody comes in and offers to put up his own money, then say, all right, nobody is going to put up his own money, so we will go the subsidy route. I do not believe you ought to try that first.

Mr. NICHOLS. The only consideration is time.

Chairman ANDERSON. That is exactly what we are talking about. If they are left uninhibited, maybe they will get along faster than if they have to make sure that the proposal they make is one that the Government thinks is feasible. I think we could go back to several other things and find that industry has learned that it moves along pretty rapidly when it is left alone.

Mr. NICHOLS. The only thing I have to go by here, sir, is a discussion with various study groups, and in going over this program with them, they have questioned whether it is adequate. In other words, even with this, if they can come up with a program.

Chairman ANDERSON. What would be the trouble of once saying to begin with, we would like to find if anybody wants a license without Government subsidy. This section is headed "No Subsidy." It is not headed, "How To Give Subsidy."

Mr. STRAUSS. Mr. Chairman, would a question be permitted by a witness? I would like to ask what the intent of that last clause in 169 was.

Chairman ANDERSON. It is an escape clause. It is a simple answer. The paragraph is headed "No Subsidy." It does not read "Instructions to the Commission as to how to give subsidy on the development of this program."

Mr. STRAUSS. The word "except" is there.

Representative HOLIFIELD. Mr. Chairman, may I now give my rendition of that section? That section was put there because some of us thought we knew that industry was not so hot to get into this thing as they indicated they were, and that this would be a means by which the program would not bog down when we opened the gates. We knew they were going to come with their hat in their hand to the Government, not only on this point, but on many other points, insurance, on longer term buy-backs, and many other points. They will still be coming with their hat in their hand to the Government. We knew the program would bog down otherwise.

I think the indication you have had from your study groups proves the point that private industry is not ready to go on a private industry basis. They want Pop to give them a little of the pap.

Mr. NICHOLS. I would say our own analysis indicates that it is not yet here.

Representative HOLIFIELD. That is certainly right.

Mr. NICHOLS. That is from our own staff.

Chairman ANDERSON. Mr. Allardice remembers a little of the history of this section, and I would like to have him give us his recollection. We have minutes that we can produce of the discussions. I am not trying to bind Mr. Cole in my views, but he expressed some things that I agree with very fully.

Mr. ALLARDICE. This section was added originally to the bill in response to certain allegations by witnesses and feelings of members that there might be a built-in subsidy in the research and reactor development. It was recognized, however, that a flat prohibition against

any funds would prevent the Government from taking into account and making use of useful facilities for research that the Government might want to have done.

Instead of having the Government have to build a duplicate facility to do its work in, the escape clause was added. It was added so that the Government could, if it saw a reactor which could do research, that it thought out to be done, and which it might have to build a similar facility itself to do, would be allowed to have that research done.

It was originally put in without the escape clause in answer to the subsidy charge, and the escape clause was added in order to allow the Government to make use of these facilities which it may not have itself, and which would do important work for the Government in research.

Representative HOLIFIELD. May I supplement that, Mr. Chairman. It was put in so that it would not preclude the Government from continuing to do research in laboratories which it now owns, and which have exclusive functions that no other private laboratory can perform for private industry. That is another meaning it was put in there for. In other words, if you want to be specific, so they could do certain cleaning of fuel elements and so forth at a charge to industry, and research in those fields.

Chairman ANDERSON. You can see, knowing that background why we are a little surprised that the sideshow has now been moved over, and the sign "Main entrance" put over it.

Senator GORE. Mr. Chairman, I do not wish to be insistent, particularly not so at this time, but I would like to renew my request and suggest that the real policy makers of the agency, the Commissioners, give us a policy statement on this point. Not now, but in their considered opinion in time.

Chairman ANDERSON. Would that be agreeable, Mr. Chairman?

Mr. STRAUSS. Yes.

Chairman ANDERSON. Frankly, I think this is the whole argument, and will be for a long time to come.

Representative HINSHAW. Mr. Chairman, may I say that the Commissioners are not responsible for anything that took place in the executive sessions of the committee. They had no way of knowing it, and what is not contained in the report is no business of theirs. They cannot speculate on what took place in executive session.

Chairman ANDERSON. I do not believe it will be found that any member of the Commission or representative failed to know what the real purpose of this language was.

Mr. STRAUSS. Mr. Chairman, I can say I did not. This has been an eye opener to me. The Commission passed this policy unanimously. I read it as it appeared there. I did not regard it as an escape clause or loophole or anything of the sort. I construed it to mean except under contract or other arrangement entered into under section 31. When section 31 was implemented, it was an exception to section 169.

Representative COLE. I simply want to observe that I am sure the Commission had no intention to deliberately circumvent the provision of 169. I am confident of that. I can see where a misunderstanding might have arisen. But it is my recollection that it was the intention of section 169 to deny the Commission from using Commission funds to create or construct initially a research or a commercial reactor.

However, in order to make that research reactor or commercial reactor later on available to the Commission's use for research purposes, that escape provision was inserted. So the question is whether it was intended that this prohibition against subsidy should apply to creating the reactor or apply after the reactor is in being, and then allow the Commission to use Government funds. I can see that there is a misunderstanding and it is not clear.

Mr. NICHOLS. What we are intending here, Mr. Cole, to use the PWR as an example, on the development of a pump, the first is going to cost a lot more due to research and development than subsequent ones. We felt that is a reasonable part of the tab for the Commission to make a grant in research and development to pick up part of the tab. That is really research and development we might do on our own or part of this reactor development program. It is that type of thing we are thinking of.

The other thing is the operation. There are various ways of operating these things. We felt we should have the right for everybody to use this information.

Chairman ANDERSON. I agree with Mr. Cole that we are not trying to accuse people of deliberately flouting the law. Remember the original language did not contain the escape clause when it was worked on by the committee and in staff. Mr. Mitchell, you and Mr. Price sat in with the staff on this matter. So we hope that you will accept the material that we will show you that was only added, as Mr. Cole has clearly stated, to permit these exigencies that he mentioned. He was in on every minute of the law. I sometimes wondered how he had the physical endurance to stay with it. I think his testimony today is extremely important, because it goes to the legislative history of this section.

All I am suggesting is that the Commission bear that legislative history very strongly in mind as it proceeds in this field.

Now, do you have a question, Mr. Allardice?

Mr. STRAUSS. We clearly must, Mr. Chairman.

Mr. ALLARDICE. Almost all the questions I have, Mr. Chairman, evolve on that subject. Do you expect to receive any license applications outside of the power demonstration reactor program?

Mr. NICHOLS. You mean 104?

Mr. ALLARDICE. 104 (b).

Mr. NICHOLS. There would be no reason why anyone could not come in as a part of this and say "We want a 104 license, we will bear all the expenses, and take your pricing schedules and you supply us material, and we will deliver you material in a certain form." That would be a straight license. If anybody is ready for that, they could come under here or independently at any time. Then all we would go by is the availability of material. In other words, the material made available for this purpose by the President.

Mr. ALLARDICE. Do you believe it probable that an industry will come in and say we would like a license which will involve only our own funds, in the light of this offer of Government assistance?

Mr. NICHOLS. I would think if they were ready to do it, they would, because if they accept money under 31 (b), we retain certain rights for distributing the information everywhere.

Mr. ALLARDICE. Would it appear logical to see whether industry is willing to go it alone under 104 (b) before the introduction of an incentive type contract arrangement?

Mr. NICHOLS. We didn't think so. In other words, the opinion was that it is still not in the cards for anyone to be able to finance a reactor on that basis. That was the opinion of the staff, the opinion of the people we talked to, and I believe the opinion of the Commission.

Representative COLE. That being so, and for the sake of argument let us assume that the opinion of the Commission and yours was justified, why didn't you proceed under section 31 (b)? You still would have the opportunity for competition.

Mr. NICHOLS. We were trying here, Mr. Cole, to shift a bigger burden of the expense to the licensee where he can pick up the check for three-quarters of it, and he owns the facility, and he ultimately can convert it into 103, if it works. We were looking here for a way to transfer that responsibility to him, both financial and picking up the risk and the responsibility for design decisions, to where we were in the position of an assistant, as long as we were getting some work that was of interest to the general program and moved the development forward.

Representative COLE. All of those goals which I agree are laudable can be accomplished through 31 (b) without any reference to 104. You can give title to the bidder. You can by competition induce the percentage of private capital upward and reduce the Government capital downward. That is all available under 31 (b). I don't want to appear to be arguing against myself, because I resist your practice of contractual operations in the development of this field. I think you should proceed as much and as hastily as possible under the licensing provisions to the end that private capital may operate relatively unrestrained and relatively without domination or control by the Commission. But I do recognize in this very early stage of the game perhaps industry is not quite ready. Perhaps it is necessary for the Commission to move on with Government funds. But there should not be this interwedding of 31 (b) and 104.

Mr. NICHOLS. We felt that by getting in the 31 (b) and the 104 also we are forming a transition step and as industry is ready to pick up the whole check, you automatically flow into it immediately, if they are ready now. Also we were worried if this reactor works, what is the transition to 103.

Mr. MITCHELL. I think the point there is that if we used 31 (b) alone, we would have had to retain title to the reactor.

Representative COLE. Not permanently. You can surrender title to any reactor you have today.

Mr. MITCHELL. We could have sold it.

Representative COLE. In the contract under 31 (b) with X company, a condition of the contract can be surrender of title to the reactor to the contractor upon completion of whatever purposes the Commission had.

Mr. MITCHELL. That in turn would involve the license. We are trying to get the license in earlier.

Mr. NICHOLS. Actually we were trying to get the license in earlier. In fact, some people proposed that very thing. Why don't you own the reactor and let us call the shots and later we will buy it. On that one we would be doing the same type of thing as in the IWR.

Representative COLE. You are doing the same thing except inversion.

Mr. NICHOLS. If we invert the percentage of money to where they are carrying the bulk of it, we could surrender the bulk of the decision. It is their responsibility if it doesn't work. They own it already. They have financed it and lost their own money, rather than the Government. That was our intent in the appraisal of the situation.

Senator GORE. Mr. Chairman, I would like to ask one question.

Chairman ANDERSON. Senator Gore.

Senator GORE. In arriving at the terms of the Duquesne contract, was it taken into consideration that the company would be entitled and probably would apply for rapid amortization?

Mr. NICHOLS. What we did on that, sir, was this. We decided that we were going to build the PWR as a Government venture. We decided to open it up to where we would get participation on the part of industry. We said nothing in the line of what the specifications would be for those offers. We got offers all the way from furnishing an acre of land or to help getting a site, up to the Duquesne proposal. We based our selection of Duquesne on the premise that of all the offers—and there were some close—that they were offering more participation than any other enterprise. We had some that came close to where they would furnish a powerplant, but in the Duquesne offer, they not only furnish the generating part of the plant, but they offered the site.

Finally, they tossed in $5 million—I would not say finally—they included in their offer $5 million for assisting in the research and development end of the program, and offered to operate it.

Then they gave us a price for steam as to what they would pay that went into their system. We didn't worry at that stage of the game as to what all the other applicable laws might do to that participation. It was better than any other offer. It was certainly better than going ahead at Government expense covering the whole thing.

That was the premise upon which we accepted the offer, because it was better than any other offer.

Senator GORE. Do I correctly understand that your answer is no?

Mr. NICHOLS. We didn't know as to how they could amortize this at the time.

Mr. STRAUSS. It was not raised. I just checked.

Senator GORE. It was not raised.

Mr. NICHOLS. It was not raised.

Senator GORE. The Commission must have been aware of the executive ruling with respect to utilities being eligible for rapid amortization.

Mr. NICHOLS. Yes, sir. The next utility that offered a steam generating plant without the $5 million and without quite as much price for steam probably could have gotten the same type of amortization if they put in for it.

Senator GORE. You have answered my question. You did not take it into consideration.

Mr. NICHOLS. We did not take it into consideration. It was strictly on a competitive basis to save the Government the most money in going forward with this project.

Chairman ANDERSON. Would it not be true that because of the use of rapid amortization they are going to be able to add extra charges to

the current, and thereby raise the per mill cost of this energy to show that it is not feasible?

Mr. NICHOLS. We will give you a complete report on this, Mr. Chairman.

Chairman ANDERSON. Would not that be the effect?

Mr. NICHOLS. There is some reservation as to what they can do.

Chairman ANDERSON. If you can add extra costs and extra charges now, you will be able to show that the per kilowatt cost is higher than otherwise it would be, and therefore show that it is not feasible to use nuclear energy.

Mr. NICHOLS. We had no intention of this plant, under the present design, as far as we see it, ever becoming economical.

Chairman ANDERSON. That is what we were fairly sure of. There is no hope then that this will demonstrate the validity of using atomic energy.

Mr. NICHOLS. No, sir. We feel that we will learn enough in the design and development of fuel rods—in other words, maybe by the third set we will get enough experience on corrosion and that type of thing—that we will be able to design the next plant on a larger basis.

In looking at the crystal ball, where people guess but don't write it down, the people have the feeling that if you take the experience which they hope to acquire in the 5 years of operating this plant, that they will be in a position to design this type where it may be down in the range of competitive power. That is why we call it an experimental plant. We hope to get enough know-how in the design of fuel rods, enough know-how on how to increase the length of life of the fuel rods by the way you clad them, and operate the plant, so that the next plant, which would have to be larger also according to their prediction, would be in the range where it may be economical. That is why we have always called this an experimental plant, and not one which comes out immediately with economic power.

That is why we felt the Government must carry the ball on the bulk of the costs on this one, and we were looking for a participant which would pick up part of the check and add know-how and operation and we did it on a competitive basis.

Chairman ANDERSON. I think I would be almost obligated to adjourn this hearing shortly, because I told members we would not be going on after 4:30 and members of the committee want to be here. I think we will have to go on with our questioning on this at tomorrow's session. It does strike some of us as extremely important. It looks as if you are sort of putting this power demonstration reactor program cart before a sort of nonexistent licensing horse. We would sure like to have a careful look at it before we get through.

Mr. NICHOLS. I think part of that will be in executive session also to cover pricing.

(Thereupon at 4:55 p. m., Thursday, February 3, 1955, a recess was taken until 10 a. m. Friday, February 4, 1955.)

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

FRIDAY, FEBRUARY 4, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met at 2 p. m., pursuant to adjournment, in Room P–63, the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson (chairman), Jackson, Hickenlooper; and Representatives Durham, Holifield, Price, Dempsey, Cole, and Patterson.

Present also: Corbin C. Allardice, executive director; George Norris, Jr., counsel to the Joint Committee; and Walter A. Hamilton of the professional staff of the Joint Committee.

STATEMENTS OF THOMAS E. MURRAY, MEMBER OF THE UNITED STATES ATOMIC ENERGY COMMISSION; DR. WILLARD F. LIBBY, MEMBER; KENNETH D. NICHOLS, GENERAL MANAGER; WILLIAM MITCHELL, GENERAL COUNSEL; DR. JOHN C. BUGHER, DIRECTOR OF THE DIVISION OF BIOLOGY AND MEDICINE; AND W. KENNETH DAVIS, DIVISION OF REACTOR DEVELOPMENT, UNITED STATES ATOMIC ENERGY COMMISSION

Chairman ANDERSON. We will resume the hearing. I think the best place to resume is with Mr. Allardice and other members of our staff questioning first and then we will come to the members later on. But probably as we found out yesterday there will be questions that will be compelling, and we will just break in.

Mr. ALLARDICE. The basic question on the power demonstration reactor program was very clearly put yesterday. That is, the determination of the Commission to choose this route of encouraging industrial activity over a licensing route. It was also placed as to whether this would deter industry from building reactors under license with all their private funds when they had in front of them the offer of possible Government assistance.

I do not wish to develop that any further. I think the issue is very clear. I do have one or two other questions on the section.

At the bottom of the page, you mention that industrial groups interested in the vital steps of fuel element fabrication, chemical processing, waste disposal, et cetera, will have an opportunity to carry out these operations on an industrial scale. I presume you mean under license.

Mr. NICHOLS. Yes, sir. Any proposal under this program would require a license. It would require at least one license. We would anticipate the possibility here that a proposal might include some of this work being done as a part of the proposal, or they could ask the Government to do it.

Mr. ALLARDICE. Do you believe that the fuel element fabrication, for example, might be one of the areas nearest to industrial interest today?

Mr. NICHOLS. It is certainly an area that industry can move into relatively rapidly. It is one of the places that if we are to have economic power there must be considerable progress. So it is a place where private industry can determine if they can do a better job than we are doing in the Government.

Mr. ALLARDICE. That is, with their private funds.

Mr. NICHOLS. With their own funds or their own facilities. This program is very flexible. If they do not desire to try that part but some other part, we may be doing that for them at a cost.

Mr. ALLARDICE. Do you believe that the AEC building for fuel element fabrication to be built at Argonne would tend to discourage industrial interest?

Mr. NICHOLS. The purpose of that particular facility was not to go in the production business, but essentially to do development work for different types of fuel assemblies. We felt we needed one facility—we have something similar to that in the weapons field—in our Government laboratories for industrial development.

Mr. ALLARDICE. Yesterday Dr. Johnson testified that as a sort of crystal-ball guess possibly 500 tons of uranium, if I recall, for a million kilowatts, plus 50 for recharge; do you think on that rate the addition of another $69 million of plant by the Commission in the feed material and refining end would tend to discourage industrial private development of that field?

Mr. NICHOLS. Of course, our addition is based almost wholly on our weapon needs, that is, the feed material addition. Whereas this new facility at Argonne, as I stated before, is a development facility.

If the industrial program overlaps the weapon program to any great degree, you will need additional facilities and we would hope they would be commercial.

Mr. ALLARDICE. You would hope that there would be commercial licenses and commercial money put into the fuel element fabrication and feed materials fabrication?

Mr. NICHOLS. That is right; I would hope so. We actually have at least one study group working on that possibility of doing some of the processing. We have one company that already is turning out such things as control rods under an authorization. In this case it happened to be helping Canada. It is an unclassified area.

Mr. ALLARDICE. Turning to page 2 of your statement, the Commission lists on page 2 certain cooperation and assistance which it will give to the lucky bidders on this power demonstration reactor program. Is there any one of these that cannot be given under a 104 (b) license, wherein there is no Government money invested?

Mr. NICHOLS. The assumption here was that the assistance and research would be under 31. I believe you have analyzed that, have you not, Mr. Mitchell? Can you answer that question?

Mr. MITCHELL. Yes. If I understand the question, it is whether under a section 104 license we would make financial assistance available in return for research and development.

Chairman ANDERSON. That is not the question.

Mr. ALLARDICE. Could I rephrase it this way: Can any 104 (b) licensee receive a waiver of the charge that he might have to pay for the use of special nuclear material?

Mr. NICHOLS. The answer to that is "Yes."

Mr. MITCHELL. Assuming of course the Commission finds it is appropriate to waive under the standards set forth in section 53.

Mr. ALLARDICE. Yes, sir; I agree. That is without reference to a contract or without reference to a selection such as the April 1 deadline.

Mr. MITCHELL. That is right.

Mr. NICHOLS. That is right.

Mr. ALLARDICE. May not the AEC perform in its own laboratories and test facilities with or without charge for any licensee certain mutually agreed upon research and development work?

Mr. NICHOLS. Yes, we can, but the question is, How do you assure the proponent here of a particular program that we are going to do it?

Mr. ALLARDICE. As to financial assistance, may not any 104 (b) licensee whose facility is suitable receive 31 (a) assistance for specific research work that the Commission wishes done?

Mr. MITCHELL. That is what we contemplate, Mr. Allardice.

Mr. ALLARDICE. What are you giving these people other than the offer of Government money, ab initio, in this approach to the industrial power program that you could not give to any 104 (b) licensee?

Mr. MITCHELL. I am not sure I understand the question.

Chairman ANDERSON. Let me say to simplify it for everybody, if you will take that one phrase "ab initio," out of there, we will all get along better.

Mr. NICHOLS. I had to look to the legal man for that.

Mr. ALLARDICE. I am trying to find out what you are offering these industrial people under this program that you could not do under a straight 104 (b) licensing arrangement.

Mr. NICHOLS. We consider essentially we are following the licensing route here, coupled with assistance so that they know what assistance they are going to get. As part of the proposal and agreement we would make on it, they could count on it. As we state here they will need a license.

Mr. ALLARDICE. Isn't that something that can be made clear in the rules and regulations which you promulgate in the issuance of a 104 (b) license in the first instance? Why do you need an agreement?

Mr. NICHOLS. I don't see how you could agree with everyone that comes along that we are going to do a certain amount of research work for them. We do not want to do the same research over and over again for everyone. So we felt somehow in order to avoid this exceeding the amount of money we had available to do research and exceed the amount of material which the President would allocate for this purpose, we would do this on a competitive basis. Again we would take the best of several proposals received, not all of them.

Mr. ALLARDICE. As regards research, the law specifies in section 33, the following:

Where the Commission finds private facilities or laboratories are inadequate to the purpose, it is authorized to conduct for others through its own facilities such of those activities and studies of the type specified in 31 as it deems appropriate for the development of atomic energy. The Commission is authorized to determine and make such charges as in its discretion may be desirable for the conduct of such activities and studies.

The key it seems to me from reading that section, is that if there are no facilities available in industrial private areas to do the work needed, the Commission then says, "We are ready and willing to receive and discuss with you these problems."

Mr. NICHOLS. That is what we are trying to do here, to receive from people an offer where there is a complete program which calls for a certain type of research to be done. They may be doing some of it. They ask us to do others that are particularly suited for our facilities and we can agree on it. For example, we might work on a particular type of reactor. It may be one not in our 5-year program. It might be another reactor they are suggesting. If they are doing enough work so that we feel that this is a good project, and it will advance the art, we then pick up that obligation to do that type of research in our own laboratories at Government expense. But for them to be able to count on it, I feel they need some type of agreement. You can't just say one man said we will do this and later someone else said we won't.

Chairman ANDERSON. Do you not see the difference in proceeding under rules and regulations which make possible these agreements, and say it is done in furtherance of these rules and regulations, than to have no rules and no regulations and allow everyone to come up and ask for any special favor he can get from the Commission by himself? What is wrong with having a standard that you have to make them all come to you. If you had rules and regulations there would be some standards.

Mr. NICHOLS. We hope to get the rules and regulations and all the licensing requirements out before this program is completely jelled.

Chairman ANDERSON. But not before its first start has been made.

Mr. NICHOLS. We are in hopes here that we will get a reasonable number of proposals by April 1. We then feel that we will have to analyze these, compare them one with another, and see which are the best or which is the best. It may be that only one will be decided on. After we receive it, it may take a good deal of discussion with the one that we pick out as being the best. Say we just pick one on April 1. It might take a good deal of discussion to have a meeting of minds how it fits in our program, where we could do this work, where it would be done, and at what schedule. Besides, we need to come to Congress to get the money for it. We would assume here under this that there would be no culmination for the best of these proposals prior to the time that the Appropriation Act was passed. We felt it would take us 2 or 3 months to really complete the negotiations with the best proposal for carrying forward the program. By that time our licensing procedures should be complete and in effect to where we felt the timing was such—although we recognize in the April 1 date we are pushing it—our objective was how to get on the work the fastest.

I can assure you that my intent and Mr. Mitchell, the legal counsel, we thought we were going essentially the licensing route. We have gone along with other assumptions which I believe the Commission

has accepted—and they are working on the statement on that to give you—that we feel that we are not at the point where with just a 104 license industry is ready to pick up the ball and pay the complete bill.

We went on the assumption that there will be some Government assistance necessary, and that this was a way of having a joint enterprise with various industries or one or more. Instead of waiting for a go-round to where we found out absolutely certain that industry would not put up 100 percent of the bill, we felt we would save time by this method which is flexible—in other words, if somebody is willing to put up 100 percent of the cost, they probably will win this competition.

Mr. ALLARDICE. What probability would you assign to anybody putting up 100 percent in the light of this offer?

Mr. NICHOLS. I have not found anyone yet that has indicated that they will put up the whole amount of money. On this thing I think you should look at it in this way. In any of these proposals you assume that there will be buy-backs of material. We could have set a very high rate for that buy-back of material. We set it at a reasonable rate which we felt would primarily encourage the development of power reactors, rather than primarily encourage the development of material for weapons. We set that rate where we felt it would achieve our basic objective. We could have set that at a higher rate. I think anything that is cooperative, where we put up a part of the money, you could term a subsidy during this research and development period. We thought it far better rather than hide a large part of this in the price paid for the materials which will be produced by these reactors and finance them that way, to bring it out in the open where it is a clearcut research and development assistance.

The second factor in that is that by making it research and development assistance, the money we put up by the Government is available to everybody. In other words, the results of that. Whereas if we had made it by the route of paying a higher price for material, I think under a straight license we would have greater difficulty passing that information—say there was no research and development assistance—to the industry as a whole.

Representative HOLIFIELD. Mr. Chairman, I want to interrupt here to say that I think the Commission was wisely and completely in accord with the law in this line of reasoning. I cannot see how they can be condemned for proceeding as they have proceeded in this particular instance.

Mr. NICHOLS. I think I am discussing the various ways of putting money into the program; we need an executive session to discuss detailed prices.

Representative DURHAM. In proceeding under section 31, in the way you have outlined here, was thought given to what might be complete control of private research?

Mr. NICHOLS. No, sir; there was no intent there. In other words, for parts of the research that we are not contributing to, we would have no control over it. But if there is something that we are putting up Government money for—in other words, the assistance we are putting in is Government money—we feel we should have enough control there that that information developed can be used by the industry as a whole. In other words, it is available to everybody. That is our general objective.

Representative DURHAM. I am talking about the difference in the licensing and the difference under this theory. It seems to me that you are requiring that they turn over to you all information. Say a basis research team, for example, General Motors or General Electric, when they accept a research and development reactor under the procedure which you outlined to us, are you not more or less in control of their private research team? In other words, that might involve even the development of a tube.

Mr. NICHOLS. We would be in control only to the extent of the money we put up. For a research reactor which is different from a demonstration reactor—I know of one group that is getting together in New York that will try to finance the construction and the operation of a research reactor, one of these bathtub types, or swimming pool types, where they will do that completely on their own under a license—in that case they do have control of the information they develop, unless it happens to be met by one of the overriding patent provisions of the law.

Representative DURHAM. I understand that. You have said that most of these projects are going to be research and development reactors. That is what you foresee until you get to the point where these industrial reactors are feasible and meet some kind of competition in the production of power.

The thing that worries me somewhat is this type of procedure is how much control you are going to have over the basic research and fundamental research of industry in this country.

Mr. NICHOLS. We are interested here only in the degree of control that represents the percent of money that we put up from the Government. In other words, to get our fair share of the results.

Representative DURHAM. How are you going to determine in your agreements beforehand as to the cost of the burn-up? How will you arrive at such figures as that in these agreements?

Mr. NICHOLS. Our pricing schedule, which applies to everybody, which we put out on a confidential basis, you could make estimates of what will happen in a given reactor. In other words, how much will burn up for a given amount of power produced, and how much will be lost in chemical processing. The actual charge made for the burn-up or the loss will be based on how much did you let them use and after you process it and convert it back; what did you recover? What you did not recover is either lost in the chemical processing or burn-up.

Representative DURHAM. That is placing quite a burden on the individual operator, because it has to go into his agreement when you make the agreement. Is that not correct?

Mr. NICHOLS. The general terms have to go into it. I would assume on this type of thing that we will decide that we will make available to you as part of the license—again it takes a license for this—so much material. In other words, it takes so much inventory to start. We estimate it will take so much to continue year by year. Then we would agree on this. Are you going to recover all the material—if it is a heterogeneous reactor with fuel rods—and turn it over to us, or do you ask us to do it?

We would agree on the price that we would do it for them for a limited number of years. At any time they wanted to, they could swing over to another type where they would do it themselves if they

have a chemical plant going with it. What is the price then for the material which is burned up and what is lost, and that is where the 7-year-period comes in that what is lost and burned up will be charged at a certain rate.

The use charge will be 4 percent on the inventory. They know the value from our pricing schedule. A good part of this will be a solely regulatory licensing system. We are trying to work into it in a gradual method. The only reason we took this approach, rather than jump right into it is that it was the opinion of the staff and the people we interviewed, and the Commission, that the industry was not yet ready to pick up the whole load, and we did need financial assistance. These are the ways by which we hope to do it during the research and development period.

I say research and development period because on practically every reactor you start—for example, the PWR—the price of fabricating the fuel assembly is so many hundreds of thousands of dollars. You assume you can perfect those methods to where that cost will go down on the third or fourth.

Second, you assume that you can do a better job of protecting the uranium that is in the fuel-rod assembly so that it is less resistant to corrosion and radiation. So instead of lasting X number of hours it will last 10 X hours. Each of these things are a step in the development.

Where the company has to gamble is that we can make a contract for this research and development assistance for a given period of years. Beyond that they have to gamble on attaining a point in reactor development that is self-sustaining from there on out. If it isn't, they start losing their hard-earned dollars.

Representative HOLIFIELD. One point on the clarification of these research and development contracts that Mr. Durham brought up. Assuming that a reactor was going to cost a private-enterprise group $10 million, and assuming that they had a problem on corrosion of metal that went into that reactor or a specific type of pump which they need which has not been developed. Assume that you would allow them a research and development contract of $1 million for the solving of this problem, and assuming further that the problem was solved, then that information on that corrosive metal or on that pump would be available to all industry, would it not?

Mr. NICHOLS. In other words, in estimating the cost of that type of work it was part of the agreement that we made under 31 (b). If we had assumed that was the purpose of the money we were putting in, under our terms of the agreement we would make with them, we would have a (c) plus patent clause that would give us the right to use that information in the industry as a whole.

Representative HOLIFIELD. Now I want to pursue it further. In the $9 million that they spent—and I think this is the thing that concerns Mr. Durham—of their own money in other phases of the reactor construction without requiring any research money from you or any services from you, which they did not pay for, they would be entitled to such technology as they developed in that $9 million sphere.

Mr. NICHOLS. That is right. If that was isolated. If it is all lumped together we would probably make all subject to the same provision. But if they isolated a portion of it where they are taking

the full responsibility and doing all the work on it, I would say it is their know-how. The only thing we would need to know, then, is that it does not violate one of the overriding patent provisions of the Atomic Energy Act for production.

Representative HOLIFIELD. That it was a discovery that was of primary importance to the advancement of the art.

Mr. NICHOLS. That is covered by the law. We need enough access where we would have some idea whether they were coming up with something of that type.

Chairman ANDERSON. Do you not think you brought out the very point right there, when you said that if they put up $9 million, and you put up $1 million, because they are doing a particular type of research, you are going to have knowledge of everything that happens of the whole $10 million contract? That is the whole point of this putting in a million dollars, so you know everything they are doing. That is exactly what we have been objecting to.

Mr. NICHOLS. No, sir. If that company wants to put up $10 million, they would get a straight license under the terms of this proposal. If they ask for assistance, then we are looking how do we protect industry as a whole with the money we put up, and we would do a fair deal on it.

Mr. ALLARDICE. If they ask for assistance under 31(b) when they have a license, that is one thing. But when you put out an invitation to bid to come in and ask you for an opportunity to ask for assistance, it seems to me it is somewhat different. Don't you see the difference in emphasis?

Mr. NICHOLS. No. I think this is flexible enough. We started with the assumption we were going to get no 100 percent participation with the industry.

Chairman ANDERSON. That is the point. You always start with that assumption. If your assumption is sound. But suppose we start on the assumption that tomorrow is going to be Sunday, and I ask you what you are going to do, but you answer on the assumption. But suppose I say it is Saturday, what then? You are starting always on the assumption that nobody is going to put any money in.

Mr. NICHOLS. If we are wrong, then, and there are companies that are ready to pay 100 cents on the dollar for all the work that is needed, they can come in with that proposal and be almost certain to win the proposition.

Chairman ANDERSON. Why wouldn't they? They will put in all the money, and you are going to put in half for the competitors.

Mr. NICHOLS. No, sir. We will not be starting 2 or 3 of the same type reactors. The best man that comes in with the best offer will be the one that gets it. If anybody comes in willing to give 100 cents on the dollar and he otherwise meets the criteria, he automatically gets the proposal.

Mr. ALLARDICE. Wouldn't it be fair to say, sir, and I don't know if it is—I am asking for information—that by this apparatus you have set up, you have substituted the incentive of dollar assistance from the Government for the incentives that the bill hoped to get from private money?

Mr. NICHOLS. No, I don't believe so.

Mr. ALLARDICE. What incentives are there left to private industry under this arrangement?

Mr. NICHOLS. The incentive here is to get a proposal accepted so that they can get on and acquire know-how in doing the thing so that they can proceed with the development here. As I stated, if there is any 1 of them or 2 that feel they can go it on their own, this proposal is sufficiently flexible to permit it. Really the reason we did this was that we could have gone the other route and said first we will see if we can get people.

Chairman ANDERSON. That is what the law contemplated.

Mr. NICHOLS. We made the judgment if we did that we would at least lose another 6 months in going on it.

Chairman ANDERSON. You substituted that judgment for the provisions of the law. The law said you should try to go that way. You said we don't believe anybody will go that way; therefore we will not go the way the law says. We will go another route.

Mr. NICHOLS. I have felt, and the Commission feels, that is why you have a Commission, to make that type of judgment. After we appraise the situation and talk to the people, we come up with a policy.

Representative COLE. Mr. Chairman, I simply want to observe, and I would like the attention of Mr. Holifield, that I am not just a little surprised to hear Mr. Holifield say that he not only approves of what the Commission recommends with respect to its power reactor program, but that he concurs in the Commission's interpretation of the law in that respect, because it is my best recollection that this section 169 which prohibits use of Commission funds in the construction and operation of either research reactors or commercial reactors was suggested by Mr. Holifield. He persuaded the committee that was advisable, and we accepted it. However, we did recognize that there would be many situations where a licensee, having constructed a research or commercial reactor, might offer an opportunity to the Commission to make available to the Commission's use for research purposes the operation or some problem in connection with the operation of that reactor. So we did make an exception, authorizing the Commission to use 31 (b) authority for research to make a contract with a licensee. But the licensee must have been established, and have the reactor in being before that research contract was made.

Just for the sake of completing the record, let me express my own viewpoint that I not only disapprove, as an individual, of the Commission's procedure under this power reactor program, but also disagree with its interpretation. Don't misunderstand me. I thoroughly agree that the Commission has the right under 31 (b) to do everything it seeks to do in its power program. But it is a mistake to tie the authority of 31 (b) into an effort to create or construct a research reactor.

You admit it is tantamount to a subsidy. You must admit that section 169 was intended very definitely to prohibit the use of Commission funds for the purpose of constructing and operating a research reactor.

Chairman ANDERSON. I subscribe very heartily to what Mr. Cole has just said.

Representative HOLIFIELD. I am glad to find my chairman and former chairman in agrement on this. I want to call attention to section 169, which says:

No funds of the Commission shall be employed in the construction or operation of facilities licensed under section 103 and 104—

103 is commercial, 104 is experimental—

except under contract or other arrangement entered into pursuant to section 31.

Then you go over to section 31 and you find out that the very thing the Commission has agreed to do is permitted under section 31. Then you find out in section 104 of the medical and research section, licenses for that type of thing, that there is provision made there for that type of license to be converted into the commercial license.

I maintain that the law stands as it is written and some judge can interpret it, but I do know what the law says.

Mr. NICHOLS. I asked my legal counsel to interpret this, and I would like him to do it himself.

Mr. MITCHELL. I think you stated it correctly.

Representative HOLIFIELD. I compliment you on your legal knowledge.

Representative COLE. Mr. Chairman, you don't need to be a lawyer to understand the meaning of the English language. I am sure that even though my friend from California admits he is not a lawyer, I am sure he will agree with me that he understands the meaning of English words. The words that are used in section 169 are "No funds of the Commission shall be employed in the construction or operation of facilities licensed under 103 or 104." It doesn't say, "No funds of the Commission shall be employed in the construction or operation of facilities to be licensed or which may be licensed." It says, "No funds shall be used in construction and operation of facilities which have been licensed."

This best bidder that you hope to get before April 1 is not going to be a licensed person under 103 and 104.

Mr. NICHOLS. He will before he gets the funds.

Representative HOLIFIELD. He has to be before he starts.

Chairman ANDERSON. The point we tried to make the other day, General, was this: We knew what the language was originally. You had people in the staff meetings. Mr. Mitchell sat there and knew the purpose, to try to have the people go by the license route. But if you find you can not go by the license route, then you can use 31 (b). So you say to yourself, since we have permission to use 31 (b), we will use that and throw licenses out the window.

It is like saying that there is a little trolley that runs from the Senate Office Building to the Capitol and I say to somebody when you are a newcomer here, that runs every day except a half hour after the Senate is adjourned you will have to walk. A year later that new Senator says to me, "I walk every day because you told me you have to walk." You have to walk when the other things fail. You go to 31 (b) when the other things fail. You said we assume they will fail, we will not even try to find out if they will fail; we will start out as if they had failed.

I assume it is a pretty violent assumption to go that way. Why not try out the thing that the Congress wanted you to try. The Commission has the right to interpret. You ought not to interpret to avoid the law.

Mr. MITCHELL. Mr. Chairman, I don't know what meeting you are referring to. The only thing I have been able to find, and we made a

careful search of the legislative history of 169 since our discussion yesterday, at the hearings early in June I did testify as to the effect of section 104. But at that time there was no section 169. Section 169 was introduced subsequently. The colloquy which I engaged in with members of the committee early in June had to do with the effect of licensing. That is the only meeting of which I am aware in which I participated in any discussion on the subject, and the precise point we are talking about now was not then involved.

Representative HOLIFIELD. Mr. Chairman, will the gentleman yield? In section 104, which is the medical therapy research and development section, and which you are obligated to issue licenses under, there are certain things set forth. It says in part that in issuing licenses under this subsection the Commission shall impose a minimum amount of such regulations as will permit the Commission to fulfill its obligations under this act to promote the common defense and security, protect the health and safety of the public, and will be compatible—and this I want you to listen to—and will be compatible—remember, this is a license for research and development—with the regulations and terms of license which would apply in the event that a commercial license were later to be issued pursuant to section 103 for that type of facility. Section 103 is the commercial type.

So we not only provided an exception from 169, but we implemented the transfer of an experimental research license from 104 to 103 by specifying that 104 regulation should be compatible with those under 103, so that it could be transferred.

It is proven not only in 169 that an exception was made, but the modus vivendi for achieving that result was placed in 104.

Representative COLE. What do you mean, "modus vivendi"?

Representative HOLIFIELD. I mean the method by which 104 could be transferred to 103.

Representative COLE. I understood you to say you had no knowledge of legal interpretation and phrases. I find that you are more legally erudite than you are ready to admit.

Representative HOLIFIELD. I modestly refuse to comment on that.

Senator HICKENLOOPER. Mr. Chairman.

Representative DURHAM (presiding). Senator Hickenlooper.

Senator HICKENLOOPER. I suppose we might as well make a good donnybrook out of this so I would like to express myself.

I find myself in agreement with Mr. Holifield on his legal pronouncements here.

Representative HOLIFIELD. Thank you, sir. This is the greatest compliment I have had, sir.

Representative COLE. And the most unusual arrangement of alliances.

Senator HICKENLOOPER. I am sorry to disagree with our esteemed chairman and our esteemed former chairman. It seems to me that section 169 is plain. There are two ways to go under that. It is like saying you cannot shoot pheasants next year except on the last three days of November. So the last three days of November you are permitted to shoot pheasants.

This says that you shan't use any Government money:

No funds of the Commission shall be employed in the construction or operation of facilities licensed under sections 103 or 104 except—

and this is an authorization, just the same as the other is a prohibition—

except under contract or other arrangement entered into pursuant to section 31.

It seems to me that is a complete authorization for the Commission to enter into contracts under section 31.

I wish we could all be in agreement one way or the other, but for fear that silence might indicate that I approved or disapproved of something that might be erroneous I would have to say that I agree with that interpretation.

Representative COLE. Let me ask, if the Senator will permit, if it has been the intention of the committee, and approved by the Congress, to permit the Commission to use Commission funds for the purpose of constructing or operating a research reactor as authorized under section 103, then why did the committee put into section 169 the prohibition against the subsidy, including section 103? If that had been our purpose of expecting the Commission to use Commission funds for the construction or operation ab initio of a research reactor, we never would have put in a reference to 103 in section 169.

Senator HICKENLOOPER. As I read section 169, it plainly says that the funds of the Commission can be used—putting it in a different order—in the construction or operation of facilities licensed under section 103 or 104 if they are used in pursuance of section 31 but not any other section. You cannot go through any other section. You must strictly follow the provisions of section 31 if you are going to use Commission funds for the the construction or operation of facilities licensed under sections 103 and 104. That is a sort of horseback opinion on this.

The former chairman, Mr. Cole, has lived with this bill for months and months and months, and I think his judgment is to be given very heavy consideration in this matter. I do not discount it.

Representative COLE. Mr. Chairman, I appreciate the reference, but I disclaim any responsibility in that regard. Every member of this committee has a right to express his understanding of the bill as recommended and the law as adopted.

Senator HICKENLOOPER. I was merely suggesting that you had devoted probably more consistent time to the preparation of this legislation than any other member of the committee. Therefore, I do not take your judgment lightly on this matter. I respect it. That is what I was trying to say. Certainly every member of the committee has a right to express his opinion. I am just trying to give a horseback guess of the thing as I read it.

Representative HOLIFIELD. If the Senator will yield, the section 31, which is the main section on research, including the two following sections, research by the Commission, and research for others—a study of that section—put certain obligations upon the Commission. It gives them certain privileges to make these contracts, agreements, and loans, and sets forth very clearly what they may do. They can do it without regard to the provisions of section 379 of the Revised Statutes. They can make partial advance payments, and make available for use in connection therewith such of its own equipment and facilities as it may deem desirable. But when this research and development is done at the expense of the Commission, that information as a result of that becomes Government property. That is where the Government gets its return on its investment. If that research and

development is converted into a commercial license later on, it is true that person gets the benefit of it, but all the rest of industry is also entitled to get that.

So you have furthered the art, and that is what we wanted you to do. Whether you make an independent research with the laboratory or with a person that is making an experimental reactor under the 5-year reactor development program, research and development is still being carried on.

I would say that the only thing that would be of concern to us would be that the Government protects itself in those contracts and would issue those contracts fairly and without discrimination to qualified people who are in the reactor program.

I yield to Mr. Durham at his request.

Representative DURHAM. I notice we have in the room a group of people from Japan. We are very glad to have you with us. If you care to have a seat, you may be seated over here.

I yield to the Senator.

Senator HICKENLOOPER. I merely wanted to state my attitude on this matter. I might have an opinion one way or the other as to the route I might hope the Commission would choose to take, but when an alternative is given to an administrative agency, I take it that the selection of the alternative is within the responsibility of the Commission, and the Commission is answerable for the success or failure of that choice.

My only question is do you have authority to do it the way you are doing it. I think you have. I might disagree but I am not on the Commission, and I am not in intimate contact or study with that. I may say that by that rule I announced, I would expect to hold the Commission accountable for the success or failure of this. If future events show that it is not the right course, it will be the Commission's responsibility for this choice. But I think the Commission has the power to make their selection.

Representative HOLIFIELD. I have been unable to follow the line of reasoning which has been advanced in questions which says to you that you have not given industry the chance to come in and do this on their own. From the testimony that you have given us, General Nichols, it seems to me you have established the fact that no industry has come forward and agreed to do this, furnishing all the funds for a particular reactor program. Is that true?

Mr. NICHOLS. Of course, all we have had is informal conversations.

Representative HOLIFIELD. But if they do come forward and offer to do the whole job, then there is no reason for you to exercise section 31?

Mr. NICHOLS. No, sir. If you look on page 4 in evaluating the individual proposals, one of the criteria would be cost to AEC in funds and materials.

Representative HOLIFIELD. Therefore, you are not resorting to this as a primary offer to industry. You hold this to say that if industry will not do it alone, that you can come forward with this, but if you put up one type of reactor program and offer it to industry, you are going to take the best bid. So if industry comes in and there are 10 bidders and 1 bidder says, "We will take this reactor program and pay all the expenses of it," that is the one that is going to get the contract, is that right?

Mr. NICHOLS. That is right, subject to these other four things.

Representative HOLIFIELD. Subject to the qualifications. So in effect you are keeping the door open to industry. If all the industry in concert says we are not going to do this unless we get so much research assistance, you either don't sign a contract with them, or go ahead and provide the assistance.

Mr. NICHOLS. That is right, sir. We felt that we would have to evaluate the individual proposals. We felt that we could do it on a competitive basis, and that we had a perfectly flexible system here.

Representative HOLIFIELD. This is the same method as you let the contract on the generating equipment?

Mr. NICHOLS. Not quite, sir.

Representative HOLIFIELD. In other words, Duquesne offered you the best deal.

Mr. NICHOLS. Duquesne offered us the best deal, but there we were talking about a specific reactor. Here we are leaving to industry to come up with variable types of reactors. Instead of picking out the reactor and asking for the best deal, we are saying come up with any reactor you select, and we will evaluate on the basis of the 5 principles on page 4.

Representative COLE. But there has never been anything said with respect to Duquesne in any of the proceedings or papers as being a licensee.

Mr. NICHOLS. That is a Government reactor, sir.

Representative COLE. I have asked the staff to bring me a transcript of the hearings of the executive session when this section was under consideration. I now, Mr. Chairman, would like permission to quote from those minutes, since they were in executive session.

Representative DURHAM. It is all right with me, unless there is objection. Is there any objection?

Representative COLE. At a later time if anybody finds any contrary expression more favorable to his position, he may bring it out, and I hope he does, because I want to have the matter clarified.

The most concise statement in a very brief minute that I can locate is one where Mr. Allardice is explaining this section 169, and after there had been some discussion as to what was intended by it, said:

> This (referring to sec. 169) was written in one of the early considerations, one of the early drafts of the bill. This was written in one of the early considerations, and the object was to make very clear that the Commission by granting licenses was not contributing funds to the construction or operation of such facilities.

Then it was said:

> You are not avoiding authorizations.

Allardice said:

> That is right, except that it is conceivable that the Commission might want to have certain work contracted for at such facilities and they should do it pursuant to the authority of section 31.

That expresses very concisely what was my recollection of the purpose and the effect and intent of section 169.

Representative HOLIFIELD. Now, Mr. Chairman, in view of the fact that has been read, I would like to read the part ahead of that, in order to make the story clear.

Senator HICKENLOOPER. Mr. Chairman, I have no objection to the gentleman reading this, as long as it has been brought up, but I do urge on the committee that reading from executive session minutes in the midst of a public hearing without preliminary discussion by the committee, that this occasion does not constitute a precedent for these things. I have no objection. I think Mr. Holifield should read that touching this point. I merely want to call that to the Chairman's attention. I think the committee should make a policy on the question of precipitating executive committee hearings into open session.

Representative DURHAM. I began by asking the committee if there were no objections, and there was no objection.

Senator HICKENLOOPER. I am not raising an objection.

Representative HOLIFIELD. I will not read very much. There is nothing in here that affects security.

Mr. Holifield asked Mr. Allardice to re-read a section which he had previously read.

Mr. ALLARDICE. 169. No funds of the Commission shall be employed in the construction or operation of facilities licensed under section 103 or 104, except under contract or other arrangement entered into pursuant to section 31.

And Senator Pastore followed by saying:

You can say specified under the terms of section 31.

That is the pertinent point I wanted to read. There is language there which can be interpreted either way. I think it should be considered together.

Mr. MITCHELL. Mr. Chairman, might I make a brief further statement?

It is my understanding that minutes of executive sessions of the Joint Committee are not available to the Commission and its staff. To the best of my knowledge, the particular material which has been read here today had not previously come to our attention and we could not obtain it.

Representative COLE. I think it is due you that that statement you have just made should have been made. Of course, it has not come to your attention. You are quite right.

Representative HOLIFIELD. It has no legal effect.

Representative COLE. I don't think you will agree with that.

Mr. MITCHELL. Let me put it this way.

Representative HOLIFIELD. Remarks made by individuals in the marking of a bill in executive session I doubt very much would be considered in a court of law when the plain intent of the language of the law itself would then be the overriding factor. It is even the overriding factor in the consideration of a law as it is written when the debate on the House floor in public is considered by the judge. The judge can take judicial notice of it, but in the face of the plain language of the law, there is adequate precedent for taking the plain language of the law and saying that Congress may have intended to do something, but it did not do it.

Mr. MITCHELL. Mr. Holifield, you are an excellent lawyer.

Senator HICKENLOOPER. I might only supplement by what Mr. Holifield said that some of the remarks made in executive session would be interesting.

Mr. ALLARDICE. On page 3 of your statement you say:

> Although it may be that no charge would be made for the loan of materials it is nevertheless planned to charge for burn-up and other costs—

and so on. Under what authority under 104 (b) license do you charge for burn-up?

Mr. NICHOLS. We assume here we are making a use charge. In other words, when we make available to a licensee material which has cost the Government money, we are charging him an interest rate while he has the use of that material. We feel that there should be an accounting when it comes back to us that any that does not come back we will charge him for.

We are doing that under two general provisions of law that normally you charge for any service rendered by the Government. Can you quote that, Mr. Mitchell?

Mr. MITCHELL. Yes. The only specific reference to charges for burn-up is in section 53 (d) (5), which states that the Commission must make charges for nuclear material consumed in a facility licensed pursuant to section 103, but it was our belief that in the absence of something in the law that said the Commission must not make these charges in other cases, that we were under an obligation to obtain a monetary return for Government property destroyed.

While section (d) (5) specifically requires us to do this in the case of 103 licenses, it was not reasonable to suppose that the Congress was saying to us that we must not do this in other cases.

Mr. ALLARDICE. Do you recognize the difference between the use charge and the consumed charge?

Mr. MITCHELL. There is a difference made, as I say, with respect to 103 licensees. This section requires us to segregate the two.

Mr. ALLARDICE. Is it not true, sir, that in section 53 generally the Commission is allowed to make a charge on research reactors for the use of special nuclear material? It is required to make a use charge for 103 licenses and in addition it is required to charge for materials consumed in 103. It is not required to make them on those consumed under 104. By splitting the two off, I wonder whether it was your opinion that this gives you authority to charge the consumed material?

Mr. MITCHELL. My interpretation, Mr. Allardice, was that we are not required under section 104 to charge for burn-up, but we are not prohibited from doing so.

Representative DURHAM. You are getting something in return for that.

Mr. MITCHELL. Yes.

Representative DURHAM. In the other you are not, because you get all the information which is adduced.

Mr. MITCHELL. No, sir, not under section 104 license. The 104 license, apart from a contract under section 31, would not produce any return to the Government by way of reporting of scientific and technical information.

Mr. NICHOLS. I could say here is a case where we felt we had the option to charge or not to charge. The reason we decided to charge was that this was a part of the general intent to go from a 104 license to a 103. In other words, to start charging for burn-up and loss.

Mr. ALLARDICE. Turning to page 4 and page 5, there are several statements occurring on both of those pages to the effect that the

Government's offer to stimulate can have a significant influence on the type of reactors which would be built, and that its pricing policy will provide a balance of probable revenues, and so on, would you say it was a fair interpretation that these activities would tend to put in the Commission the direction of the technical directions which industry would develop?

Mr. NICHOLS. I would not say it is a technical direction if you mean by that directing the work.

Mr. ALLARDICE. No, selection of choice of avenues of approach.

Mr. NICHOLS. It does have some basis for giving us a little influence. In fact in one particular type of case, quite a bit of influence on the selection of the type of reactor. As pointed out here, we are interested here in giving incentive to the type of reactor which leads to power. In other words, the cheapest power. That is rather than the type of reactor which leads to the greatest production of plutonium for use in the weapons program. We could have slanted that either way by the way of the price we set for the value of plutonium and U 233. We could have slanted this thing where you could have reactors which have very short burn-up and would be great producers of plutonium. That would have been something which for a weapons program is fine, but from the standpoint of how do you get to economic power, which you are looking for, it is long burn-up.

So there is some direction to the program. Again here the Commission acted as a policy matter, what way do you want to give this direction; what is the best way to really get to economic power. As General Manager, that is what I call a policy decision in this type of thing.

Mr. ALLARDICE. You have mentioned the limitation of materials available. Has the President established the quantity of material to be available?

Mr. NICHOLS. He has not yet established it because we felt we wanted to get some idea first as to how many worthwhile programs we might have under this program.

Mr. ALLARDICE. So it would not be possible for a licensee to have any way of knowing about material?

Mr. NICHOLS. We are assuming within the limits of the funds that we put in the appropriation bill for 1956 fiscal year that the demands on the material can be met. In other words, we can get the Presidential approval. We have informedd the President that we will be coming up for the authority. He has been warned and given some idea of the magnitude of what is required here. We felt we might just as well wait until we were ready with a specific proposal and go up and get the specific authorization for this year for the diversion of material.

Representative COLE. I just want to understand what General Nichols is saying. You are coming up for authority to do what?

Mr. NICHOLS. We will require here a Presidential directive for the use of material in this type of program. We go up each year.

Representative COLE. Go up where?

Mr. NICHOLS. To the President. He directs how much is produced and what happens to it.

Representative COLE. I thought you said we are coming up here for authority.

Mr. NICHOLS. No, sir. We go to the President. In this case we felt it would be better to get more data before we asked for specific authority. But in asking for authority for calendar 1955, we indicated that we would be coming back as soon as we had more data, asking for the authority for this program.

Representative COLE. There is not any doubt in your mind is there, General Nichols, or do you know of any doubt in the minds of the Commission, but that the President will grant the authority?

Mr. NICHOLS. No, sir. That is why we put it in the letter. It is my understanding that Mr. Strauss has discussed it with him. I am certain he will be interested in diverting the material required to move forward on this program as fast as we can. We know we have a go-ahead for developing atomic power as fast as we can. This is one of the things which are required to do it.

Chairman ANDERSON. You would know if Mr. Strauss had discussed it with him, would you not? It is Commission business.

Mr. NICHOLS. I helped prepare the letter which pointed out that this was coming up.

Chairman ANDERSON. It would be part of the business of the Commission.

Mr. NICHOLS. Yes, sir, so that we have the understanding that we will get the authority when we need it. At least that is my understanding.

Representative COLE. Certainly the Commission would not recommend to the President that the authority for the diversion of this material for research or nonmilitary purposes would be approved unless the Commission were completely satisfied that the supply of this material was ample to justify the President granting the authority.

Mr. NICHOLS. That is right. It will go up as a Commission recommendation to the President for the diversion of this material.

Mr. ALLARDICE. The point I was trying to make there is this. How can an industry even consider a license if it doesn't know what the President's determination of the amount of material available to industry generally will be? From that, haven't you by this action of soliciting bids without the Presidential determination, and without a licensing procedure again directed industrial interests toward those actvities which you would like them to go into?

Mr. NICHOLS. No, sir, we don't feel that is necessarily true. We indicated that we are going forward on this program. We state there is availability of material.

Mr. ALLARDICE. One of the points you make in defending the position—I am not taking a position one way or another, but trying to elucidate information—is that there is a scarcity of materials. Yet you have not recommended to the President the amount of materials that would be allocated to this program in the next year.

Mr. NICHOLS. If we get no proposals we don't allocate anything.

Chairman ANDERSON. If you do not allocate any, you will not get any proposals. It is a question that a friend of mine is in love with a girl; she won't marry him until he quit drinking, and he could not quit drinking until she married him.

Mr. NICHOLS. We had to put that limitation on because the Congress has not yet appropriated them. We assume that they will, and I think the average group that would be interested in this type of proposal should certainly be able to judge that the Atomic Energy Com-

mission, this committee, and the administration is moving forward in atomic power.

Representative DURHAM. We moved a little faster on the international approval. That request was made by the Commission. I do not know how many applications you have for it. But you based that on applications before you set it aside.

Mr. NICHOLS. I think there will be no question about the allocation of material.

Representative DURHAM. I should not think so, either.

Representative COLE. On the point raised by Mr. Durham, there has been no transfer of this material under the President's international plan?

Mr. NICHOLS. No, sir. All there has been is an allocation to this general purpose with nothing set out yet as to how it would be distributed, or under whose control; or anything else. All that has been stated is that for this general purpose there has been an allocation.

Representative COLE. For whatever worth it may be to the end of guiding possible applicants under your April 1 program or applicants for licenses with respect to the availability of the necessary nuclear materials, can you now state whether or not it is your best judgment that there will be available ample supply of nuclear material to meet the applications and requests which you anticipate might be made?

Mr. NICHOLS. Yes, sir, I think we can state that.

Representative DURHAM. Of course, that was charged against your stockpile. I am thinking of the production of material this year.

Mr. NICHOLS. Right from the beginning we have been diverting material to research and development, and never had any trouble on that of diverting the amount required to assure progress.

Mr. ALLARDICE. Will the materials for the reactors that you hope to get bids to have built be chargeable against this allocation by the President?

Mr. NICHOLS. What is that question again, sir?

Mr. ALLARDICE. Will the fissionable or special nuclear materials required to operate the facilities which you hope to have built under these proposals you have solicited for April 1 be chargeable against the determination of the special nuclear material by the President to be available for distribution by the Commission pursuant to section 53 or 54?

If your answer is yes, have you not preempted a considerable portion of the amount of material that would be available to those purposes you believe best, leaving industry with a pittance?

Mr. NICHOLS. We felt with the amount of money we had in the budget, and what we could expect for a reasonable program here, it would not be too great a diversion from the production that is coming out of the production line at the present time.

Mr. ALLARDICE. Do you believe the section, and I refer to 41:

> The President shall determine in writing at least once each year the quantities of special nuclear material to be produced under this section (that is by the Commission and not outsiders) and shall specify in such determination the quantities of special nuclear material to be available for distribution by the Commisison pursuant to section 53 or 54.

Would you believe it reasonable to infer that this section was inserted in order to publish, so to speak, or a guarantee that there would not be a cutoff of materials available to industrial interests? In other

words, to allocate by Presidential direction a certain percentage of these for these purposes?

Mr. NICHOLS. I think we will need to get an allocation to assure any licensee that he has a continuing supply. Anybody going into this would need assurance that you would have a continuing supply, except under certain provisions in the time of emergency. I would like Mr. Mitchell to speak to that.

Mr. MITCHELL. I think that is right. I think we have to read this in connection with section 53 (a), which provides that the Commission is authorized to issue licenses for the possession—and I call particular attention to the following language—to make available for the period of the license and to distribute nuclear material, and so forth.

Mr. ALLARDICE. I agree with you. Your answer is yes to my first question.

Mr. MITCHELL. Yes, sir.

Mr. ALLARDICE. Does not this solicitation of bids or licenses, if you wish—I will concede it may be licenses—tend to preempt for the purposes that the Government selects the material which might be available for industrial activity?

Mr. NICHOLS. You mean as distinguished from using it for weapons?

Mr. ALLARDICE. No, as distinguishing that made available for outside, without Government assistance.

Chairman ANDERSON. I understood him to say that if you have pet projects of your own, if you have pet reactors that you want built, and you preempt this material that is available, and taking bids on those things and channeling it into those patterns, what is remaining for industry. In other words, you have automatically controlled the type of development there is by this system of bidding.

Mr. NICHOLS. We feel that if the number of proposals that came in and you really were at the point where we would be swamped with requests for 100 percent payment by industry to build reactors, we would then have a decistion to make which is not solely an AEC decision, but probably of the Security Council, how much can we divert at this time from weapons. Once that decision was made by authority in this case higher than the Atomic Energy Commission, we would then have to say if it isn't enough to go around, how do we determine where it goes. In other words, if there is 1 route or 5 routes that advance the art more than another 6, I think it is the Commission's job to make that determination. Our feeling here is that we are not going to be swamped with such requests, and that the amount that we will need to carry forward a reasonable program, in other words, based on the applications we get, will certainly be within the limits than can reasonably be diverted from the weapon program at this time. So we don't anticipate that problem on this go-round.

Chairman ANDERSON. Is it not your understanding that it is at least 3 years before they will be using this type of material?

Mr. NICHOLS. We would have to start diverting some material—our estimates we can give in the executive session—are very low for the first year. You need certain things for criticality tests.

Chairman ANDERSON. But it takes at least three before they make much use of it. Dr. Johnson was testifying just yesterday that by 1961 if the present production schedules kept up we would have so much of the stuff that he wouldn't know what to do with it. Why worry?

Mr. NICHOLS. I am not worrying. I assume we have enough in the present program that we have all we need to carry on the program, combined Government and industrial, for the next few years without interfering with stockpiling of weapons.

As time goes on, as the increase for industrial need goes up, our capacity increases at a given rate. In fact, Dr. Johnson pointed out there may be a time when the weapon demand falls off before the industrial demand picks up to equalize our production output. You are really looking into a crystal ball in judging that.

Mr. ALLARDICE. Is your judgment based on the belief that industry would not come up with proposals for licensing?

Mr. NICHOLS. No, sir. We expect industry to come up with proposals for licensing, but we expect that they will also ask for assistance.

Mr. ALLARDICE. That was my next question. Do you expect them to come up without a little carrot, as you put it, in your April 1 bid?

Mr. NICHOLS. We felt it better to put a little carrot out because we felt they would not come up without it. We felt that our program was flexible enough if they didn't need the carrot, they were assured the material was available for a particular type of reactor, and to get a start on others where they will say we will forego your carrot because we don't want any 31 research, because of the fact that we lose control of certain patents that we might have otherwise.

Mr. ALLARDICE. This was a subjective judgment. You had no way to measure it objectively. You had no applicants to judge by.

Mr. NICHOLS. I talked to industry on this—I was on a committee back in 1948—and it eventually got into the Atomic Industrial Forum. This is one particular part of the atomic energy business I followed before the Hiroshima bomb. It is my judgment that they are not ready. I think the Commission backs me on that. I believe they will state it in writing here. They have, in fact. Everybody has passed on this paper that came forward. They passed a paper unanimously which set up this program which is based on that assumption.

Mr. ALLARDICE. Was this program contemplated when you testified on amendments to the Atomic Energy Act of 1954?

Mr. NICHOLS. A variation of this approach. I think at that time we called it the reactor of the year. In fact, the first Commission meeting I attended before I was General Manager in discussing the future of reactors, this type of approach was discussed—how do you set prices and something between a weapon use and a fuel use, and what is a fair value. It has been evolving. It was discussed at the time of the Atomic Energy Act. I know I had something similar to this in mind when I was giving testimony before this committee. I watched very carefully that the provisions of the bill would permit such approach. I found after the bill was passed that my legal people and the comptroller went round and round as to how do you set up the procedures here, and how do you get a wording that will meet this objective.

Then I reconfirmed all through the period here by talking to study groups, do you think we made the thing optimistic enough for a return on money. As I see it here for anybody to come in on a proposal, they have to be ready to lose part of their money as a research and development venture. In other words, if they expect to get out whole and by the Government giving the rest of the money here in the form of a research and development grant, I don't think it is in the cards.

I think they have to put in a certain amount of their own money for research and development to develop the art.

That is my own appraisal. I believe that is the appraisal of the staff. In fact, in going over this program with some of the people that hope to make proposals, they said, "Boy, you have made it tough." One expressed to me, "I am all with you as far as being a taxpayer is concerned and American citizen, but you sure have made it tough for us to come up with a proposal."

Representative HOLIFIELD. They would like to have a little more incentive?

Mr. NICHOLS. Yes; they would like more incentive. Maybe I am wrong and maybe the Commission is wrong. If we are, it is flexible enough so they can come up with 100 cents on the dollar.

Representative HOLIFIELD. You will know April 1 how anxious they are to get in.

Mr. NICHOLS. That is right. I felt the only way to find out was to come out with a program and we will find out how interested they are. Maybe we have set the date too early, but we hope not.

Representatives HOLIFIELD. If you set that date so early so that no one but the study groups can qualify for it from the standpoint of the background and "Q" clearance and that sort of thing, and there is an active interest of getting into this by other parties which cannot qualify by April 1 deadline, I am going to be the first to ask this Commission in the interest of the furtherance of the art to set another deadline as of June 1 or July 1.

Representative COLE. That would not be necessary. Wouldn't the Commission do that on its own?

Mr. NICHOLS. What we propose to do on that is that if we feel we have a broad enough base to where we have good proposals, we may pick out 1 or 2 of them and say let us go forward with this in the interest of getting the art going faster, but set another deadline—maybe it ought to be October 1, rather than June 1, it probably should be—so that we won't try to use, unless it is just astonishing results, all the money we are asking from Congress on the first go-round.

My own feeling was that probably this April 1 date should be supplemented afterward with a date like December 1 of next year, so that the people who have gotten a late start can come in for the second race. That is something for the Commission to decide, based on the proposals we receive, and you can only make that decision when you see the nature of the proposals.

Mr. ALLARDICE. I have about three more questions or so on this section.

Do you recognize any inconsistency between your testimony in these hearings, and the testimony on the bill last year regarding the interest of industry in getting in the field?

Mr. NICHOLS. I was a little more optimistic last spring, but I was thinking at that stage of the game of higher prices for materials produced in reactors. We didn't have at that time as thorough price studies as we have made to date and the basis for setting some of these prices.

Mr. ALLARDICE. I would like to pass to the section in which you mentioned insurance, page 6. You say that the solution to this problem, that is, the ability to acquire liability insurance in sufficient

amounts, is not now in sight. What is the Atomic Energy Commission attempting to do to help meet this situation?

Mr. NICHOLS. We are holding a conference in the very near future among insurance people to try to stir up thinking in the insurance industry to where we can see what they can cover. There is some difference of opinion as you know in how much they can cover of the risk. There is also some difference of opinion among various companies as to how much coverage they need. I discovered that. Some of them are very conservative, and some have said we think we can assume this.

The reason we have said it is not now in sight is because it is not clear cut. We still have hopes. We felt it necessary to alert this committee to the fact that here is a potential problem. I think it is something you should look into. We will be looking into it. It may require some additional legislation.

Again, that was one of the reasons why we set an early deadline. We felt if all of them come up with this as a block we then have some more ammunition to come up with a proposal to Congress. Or we may find we don't need it, that it is adequate.

Mr. ALLARDICE. Will all of the applicants under this April 1 arrangement hold the Government harmless in risk?

Mr. NICHOLS. The law is pretty specific in that regard if they own the reactor. I have been asking Mr. Mitchell to find a way under the law to cover the overall business. He has not found one. Maybe that was your intent. It probably was.

Mr. ALLARDICE. Will the Commission forward a report on the subject and any recommendations if any legislation by Congress is required?

Mr. NICHOLS. As soon as we determine that we need a change in the bill, we would forward such a recommendation. Here is one case we are following, I believe, the route that certain members of the committee would like us to; go find out. Maybe it is adequate.

Mr. ALLARDICE. I have no further questions, Mr. Chairman.

Representative COLE. Mr. Chairman, I would like to elicit the interpretation of the general manager and his counsel with respect to their understanding of the effect of section 261 governing appropriations available to the Commission.

The first sentence, and that is the important sentence of that section, reads:

> There are hereby authorized to be appropriated such sums as may be necessary and appropriate to carry out the provisions and purposes of this Act, except such as may be necessary for acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction or expansion.

Do you interpret the exception contained in that section which requires specific authorization does not cover your reactor development program?

Mr. NICHOLS. You mean the 5-year program?

Representative COLE. I am talking about this April 1 matter about which you made your statement, the reactor development program. Do you feel that you must come to Congress and obtain a specific legislative authority in order to obtain funds from the Appropriations Committee, or has that not been considered?

Mr. NICHOLS. I can't give you an offhand answer. Maybe Mr. Mitchell can. We have submitted to this committee a letter on authorization under this particular provision and an outline of what our budget requires this authorization for fiscal 1956. In fact, we have included some item for which we do not feel we need the authorization, but in order to make it clear just what we are doing, we have gone beyond what we think is necessary.

Can you amplify on that, Mr. Mitchell, as to the specific part of this program? I don't recall whether it is in or out.

Mr. MITCHELL. I don't know what we have in our budget, Mr. Cole, with respect to this program, whether there are any items in the budget that would come under the heading of plant and equipment. But, as Mr. Nichols has said, we have submitted to the committee a proposed authorizing bill.

Representative COLE. Which committee?

Mr. MITCHELL. Your committee, sir. This is now before you. It is a bill which we suggest be enacted under section 261 to give us necessary authority in connection with our budget for fiscal year 1956 to acquire any plant or equipment that we may contemplate.

Representative COLE. Under this program?

Mr. MITCHELL. I don't know whether there is anything in this program that comes within this category.

Mr. NICHOLS. There is in a way. As I stated earlier, we put in the budget this year for accelerating the reactor program $75 million; $50 million of that was put in development funds, which I do not believe requires authorization; $25 million, as I recall, was put in under plant and equipment which would require authorization. We had a rather broad description of that, not knowing what type of proposals we were going to receive.

Representative COLE. Is that $25 million for which you have asked legislative authorization that you intend to use to carry out the April 1 program?

Mr. NICHOLS. We worded it the whole $75 million and made a cross reference to it. We had $75 million to increase industrial participation and accelerate the reactor program. In getting it through the budget, we recognized that we had to have a rather nebulous defense of it. We feel we will still have a nebulous defense until we see what type of proposals we receive here as to what part really is development and what part is really plant and equipment.

Representative COLE. Do you consider that any money which you might spend to carry out the April 1 program the Commission determines to be the most desirable, that the Commission's funds of that particular project are such as to come within the requirement of a special legislative authority for the expenditure to carry out that purpose?

Mr. NICHOLS. Not the part that would be for research and development.

Representative COLE. Even though that money is used for the construction of a facility?

Mr. NICHOLS. My comptroller is very specific on that, that we can't be spending any of that money for bricks and mortar.

Representative HOLIFIELD. Your statement said that.

Mr. NICHOLS. My statement said that. That is certainly going to limit the amount of money we can put in under 31(b). There we

have definitely to be certain that it is research and development. I did use the illustration, though, that in the development of a pump, a particular part, I think it is fair to say that the practice has been in many Government agencies that a part of that first pump can be considered as research and development as distinguished from the cost of the second, third, fourth, and fifth.

Representative COLE. It is your judgment that the money you need to carry out what I will call the April 1 program is not covered by the prohibition of section 261. Why did you just tell us now that in your request for authorization there was an item of $25 million?

Mr. NICHOLS. In writing this up at the time we prepared the budget, we did not know that there might be a requirement as part of the program we were doing in our laboratory that we might need some facility to carry it out.

Representative COLE. Is that part of your April 1 program?

Mr. NICHOLS. Yes, sir. Where we state that we will do work in our own facilities that we agree to. We did not know how to divide this $75 million. We arbitrarily picked 25 and 50 because we had no way of knowing ahead of time as to the nature of the proposal. Again that is one of the reasons why we set this early date.

We felt in justifying that division—I think I was responsible for it and more or less pulled it out of the hat after the staff argued pro and con as to whether it should be bigger or smaller—if we feel we have some of these proposals we can refinance that distribution. And with the consent of the Budget Bureau, we can ask for a change in it when we defend our budget for fiscal 1956.

Representative HOLIFIELD. I believe that complies with sections 32 and 33. Section 32 is research by the Commission and section 33 is research for others. I think your identification of that $25 million complies with the function under those two sections.

Mr. NICHOLS. We also may find we may want to accelerate a part of the 5-year program with some of this money. We wanted to keep ourself flexible here to move in whatever way would push this forward the fastest.

Chairman ANDERSON. Mr. Norris?

Mr. NORRIS. I wanted to be sure that I understood the line of questioning that preceded.

As I understand it, you said that the President has not made a determination of the quantities of special nuclear material to be available for distribution by the Commission.

Mr. NICHOLS. No, sir; I said he had made it for this year. But in putting forward our recommendation we stated we would come back again in the spring for an additional allocation for carrying forward the reactor program.

Mr. NORRIS. But he has not made a determination of the material to be available for distribution by the Commission yet?

Mr. NICHOLS. Yes, sir; he has. He has made one general allocation for calendar year 1955, the material to be produced and how it is to be allocated.

We already have a big allocation for research and development and an allocation for weapons, of course. That was the part of the program that we felt was firmed up. We went up and got the allocation.

We also warned him we would come back. In other words, that was not the final for the year.

Mr. NORRIS. That was for weapons?

Mr. NICHOLS. Weapons and research and development.

Mr. NORRIS. By the Commission?

Mr. NICHOLS. And the reactor program that we visualize at the present time. But we warned him in our letter that we are coming back. We have interpreted the law that it does not say just one allocation a year but at least one.

Mr. MITCHELL. That is right.

Mr. NICHOLS. We felt we would wait until we had more data.

Mr. NORRIS. Can this be discussed further in public at this point?

Mr. NICHOLS. Not the quantities; no, sir. At least I would prefer not to.

Representative COLE. I confess I am completely confused. I understand you to say maybe a half hour ago that the President had not allocated the special material for the reactor program.

Mr. NICHOLS. For the demonstration program, the one which we have been discussing here, sir. In other words, the power demonstration reactor program has not been allocated as yet. The allocation has been made for our general research and development, like in biology and medicine.

Mr. NORRIS. For your own general research and development?

Mr. NICHOLS. Yes, sir, in other words, the 5-year program.

Mr. NORRIS. That is exactly what I mean.

Mr. NICHOLS. And weapons research.

Mr. NORRIS. But this is not for use by the Commission pursuant to licenses?

Mr. NICHOLS. I believe there is some in there. We had some estimates of certain reactors that we know are coming in.

Mr. NORRIS. Under licenses?

Mr. NICHOLS. They will be under license.

One started long before the act of 1954. I want to amplify on handling some of these cases in an experimental paper which we are preparing. Let us take one for example, the reactor for the University of California, Los Angeles, the material to be allocated there.

Mr. NORRIS. That is specified?

Mr. NICHOLS. That is included in the estimate.

Mr. NORRIS. A specified amount set aside for that?

Mr. NICHOLS. What we did was to make up an estimate of the various uses that we could see at the time we went forward at the beginning of the year—all those that we anticipated—and we included those in the general allocation which has been approved.

Mr. NORRIS. Would the University of California on this reactor as a 31a reactor?

Mr. NICHOLS. I need to check on that. They do on the——

Mr. NORRIS. As a 31a or a licensed reactor?

Mr. NICHOLS. It will be a licensed reactor. On that one we have been going forward before the act was passed and we have had considerable difficulty—we do plan to do research in that reactor—ironing out the terms that we need here because the University of California has had trouble on the hazards. In other words, what are the hazards, what are they assuming? They have the same type of thing we

have, a board of regents. They have had considerable trouble finding out how they assume this responsibility.

Mr. ALLARDICE. General, you mentioned that you had estimated the amount of material that you thought there would be need for in this period or you can forsee a use for this period.

Mr. NICHOLS. That is right, for calendar year 1955.

Mr. ALLARDICE. Is this the way you intend to get this allocation each year or will it be a judgment as to the amount that is needed in the military program and what can safely be diverted and not how much you see is needed?

Mr. NICHOLS. We include both in the same letter. In other words, what will be the weapon production, what will be the production of material, and what will be the diversion to research and how you break that diversion up.

Mr. ALLARDICE. I realize that.

Mr. NICHOLS. Weapons and test and that type of thing.

Mr. ALLARDICE. What I was getting at was, the amount of material you recommend to the President to be set aside for distribution by license, are you arriving at that amount by knowing the number of reactors to be built or is this a judgment of the amount that can be safely made available in our national interest?

Mr. NICHOLS. What we have done in our allocation to date is that we have allocated for everything we knew was coming up we felt would be built or started this year.

In this new program, the power demonstration reactor program, we would come up with an allocation that would be small in calendar 1955. We felt that by the time we get the allocation for 1955 for this program we must estimate what percent will this be year by year or the future so that a decision can be made as to whether it interferes unduly with the weapon program.

Representative COLE. General, I hate to see the record leave your response to Mr. Allardice's question in the form you have left it because he asked you in making your estimate of what might be available for nonmilitary purposes you considered an estimate of what would be anticipated would be requested for nonmilitary purposes, or did you decide what you needed for defense purposes and then make available what is left over?

I hope your answer is, and if your answer is not, that your first estimate is what you are going to need to meet the national security and then make available what is left over. If that is not your answer, then certainly the Commission is in violation of the law.

Mr. NICHOLS. What we have done is that we have indicated to the Department of Defense as to what is being made available for weapons. They also know what is being diverted.

Representative COLE. But your primary consideration in evaluating and baling out what is available for weapons and nonweapons is what is needed for weapons?

Mr. NICHOLS. That is right, sir. In other words, how do we meet the requirements as stated by the Department of Defense? They give us a schedule each year as to what they feel should be the schedule of production. We state that in turn to the President at the time we ask for this allocation, the number of weapons that are going to be produced or the material produced for weapons, and he knows the numbers. That is coordinated so we are meeting the DOD requirements.

Representative COLE. I ask this question only because somebody in the country might entertain an apprehension that this move of using the nuclear material for nonweapons purposes might tend or be inclined to jeopardize our security program. That is the only reason I asked the question.

Mr. NICHOLS. At the present time in our opinion we are not in any way jeopardizing the weapons program. By having the President make this decision, if the DOD got to a point where they did not agree with us, it would be a Presidential decision.

Chairman ANDERSON. I am afraid if we are going to finish all the rest of these papers this afternoon we will have to get on with the task.

Mr. NORRIS. May I ask one last question on this subject?

Chairman ANDERSON. Surely.

Mr. NORRIS. General Nichols, how can you expect anyone who is interested in the field to make any kind of a reasonable bid, as suggested by your program that we have just been discussing, until that person knows what expenses he will have to incur to abide by the regulations which you have not yet issued?

Mr. NICHOLS. You mean such things as security, health, and so on?

Mr. NORRIS. Exactly.

Mr. NICHOLS. We feel this is one of the reasons why you need a time between April 1 and money is available. Certainly any proposal that comes in as to where it is going to be located, before it can become final, our reactor safeguard committee would have to look at it. We would hope before any of these are final that we would have all of our rules and regulations and licensing procedure. But we do not anticipate the difficulty to where they cannot make a proposal that we can evaluate. You might say another problem is how do they know what our charges are for our services.

Chairman ANDERSON. You have not answered the question. He asked How can they make a bid until they know what the requirements are going to be? How can they make a bid until they know what your rules and regulations are on safety?

Mr. NICHOLS. They have an idea of what our safeguard committee has been following in the past.

Mr. NORRIS. That is all, Mr. Chairman.

Mr. NICHOLS. They know what our security regulations have been in the past. We hope to get these things out. As I state, we are working on them. We will start industrial conferences on them this month.

Chairman ANDERSON. It is like asking a man to bid on a road when he does not know how wide it is going to be or the thickness of the concrete or the base.

In any event, go ahead, Dr. Libby, on 7.

Dr. LIBBY. The general counsel will present section 7 on patents.

VII. PATENTS

Mr. MITCHELL. Commission patents: The Commission currently has a portfolio of some 747 patents. It is anticipated that an additional 125 patents will issue on Commission-owned application during the coming year.

Abstracts and lists of Commission-owned patents are released at periodic intervals and, when appropriate, are published in technical

journals and periodicals. The interest shown by industry in these patents is seen in the fact that the Commission's Patent Branch alone has handled over 1,000 inquiries concerning abstracts, lists, and individual patents and has issued some 390 nonexclusive royalty-free patents.

Inventions conceived during Commission contracts: Since the passage of the new act, the Commission has continued to incorporate its standard patent provisions in contracts, with the particular type of clause used being dependent upon the nature and scope of the contract. In contracts primarily for research or development or for the operation of a facility, the patent provision provides for a determination by the Commission of the rights in and to any inventions. Such a clause is referred to as a type A patent provision. In instances where the work under a contract pertains indirectly to basic research and development and relates to a general field of activity of the contractor, the retention of a nonexclusive license by the contractor in fields other than the production of special nuclear materials or atomic energy is provided for under what is referred to as the type B patent provision. Where the work to be performed pertains only incidentally to research and development in which the Commission is interested and relates to a field in which the contractor has an established industrial and patent position, a type C clause is used. This provision allows the contractor to retain a sole license with the sole right to grant sublicenses for purposes other than use in the production or utilization of special nuclear material or atomic energy.

In power study agreements the Commission has employed the so-called "C+" patent clause. This provides, in effect, that inventions conceived in connection with the work under an agreement will be reported to the Commission and that the participant will retain an exclusive irrevocable, royalty-free license against all but the Government, with the right to grant sublicenses for purposes other than use in the production or use of special nuclear material or atomic energy. With respect to these uses, the participant will retain a nonexclusive, irrevocable, royalty-free license. The "C+" type clause will be continued in study agreements and will be used also in access and commercial agreements. This clause provides an incentive for the participant to make technical developments, and at the same time assures that inventions used in applications of atomic energy and based on information developed at public expense will be available to all. However, contractors will retain full proprietary rights to unclassified developments which do not involve AEC funds, facilities or data.

To the extent that the Commission would be entitled, under section 152 of the act, to any invention or discovery the rights to which are retained by the contractor under the various types of clauses mentioned above, the Commission has determined that it is appropriate under the statute to waive its rights to any such invention or discovery. Further, all three clauses are consistent with the rights of the Commission under section 159.

The number of patent applications submitted by the Commissioner of Patents to the AEC pursuant to the provisions of section 152 have thus far been very few in number (six as of this date), although several hundred applications have been reported by the Commissioner of Patents under both the 1946 and 1954 acts.

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The length of time necessary to prosecute a patent application to issuance, together with the high rate of abandonment due to prior-art references, indicate that there will not be a large number of applications submitted to the Commission under section 152 within the next year. Further, many of the pending applications relating to inventions or discoveries useful in the production or utilization of special nuclear material or atomic energy which are in condition for issuance have resulted from Commission sponsored work, and the Commission's rights in such inventions have been determined in accordance with the provisions of the governing contract. Finally, many applications are held under secrecy order, by reason of classification, and no patent may issue until the subject matter has been declassified and the secrecy order rescinded.

On the limited number of applications submitted under section 152, no statutory directives to issue the patents to the Commission have been filed with the United States Patent Office.

Compulsory licensing: During the course of the congressional hearings on the 1954 act, the Commission formally expressed the view that it appeared advisable to have compulsory licensing in the field of atomic energy for a limited period of time. Nothing has transpired since the passage of the act which justifies any different view now. The few patents in the field which have not arisen out of Commission sponsored work do not provide a sufficient basis upon which to evaluate the role of compulsory licensing in the atomic energy industry. It should be noted, moreover, that the compulsory licensing provisions of section 153 of the act are deemed by the Commission to establish a reserve power. It is not anticipated that this authority will be invoked, except under compelling circumstances.

Feasibility of administration: Both sections 152 and 153 present problems of real difficulty still to be determined. For example, section 152 is applicable not only to an invention conceived under any contract, subcontract, or arrangement, but also to one conceived under a "relationship" with the Commission. Broadly interpreted this might cast doubt on the patent rights of an individual who has entered into an arrangement of any sort with the Commission, even though no Government funds are involved, and Commission facilities or information are not used. The lack of stautory standards with respect to the waiver provisions of section 152 creates the problem of determining when it is "appropriate" to waive the property rights which the act vests in the Government. A similar problem is presented in determining when, under section 153, an invention is of "primary importance" to the production or utilization of special nuclear material or atomic energy or that a licensed use is of "primary importance" to the furtherance of the policies and purposes of the act.

On the whole, however, it is felt that the hazards presented are not insurmountable and it is concluded on the basis of present knowledge that the administration of the patent provision of the 1954 act appears feasible.

That, sir, concludes my statement.

Chairman ANDERSON. Mr. Norris?

Representative COLE. Before counsel, Mr. Norris, starts out, let me observe some degree of amusement on the statement of counsel with respect to admission of 152.

I well recall the haw and cry that the Commission submitted to the committee in opposition to the adoption of 152 that it would throw upon the Commission this tremendous administrative burden that would take all of the Commission's time and the patent attorneys' time canvassing these applications.

Now you tell me there will be six, and you anticipate there will not be very many?

Mr. MITCHELL. I think you are quite right.

Representative COLE. I do not want to be unkind.

Mr. MITCHELL. I agree, our fears have not been realized, at least up to this point.

Representative COLE. Thank you.

That is all I have. I could not let it pass.

Chairman ANDERSON. We are always happy to have a member of the committee point out the fact that once in a while the committee might be right.

Mr. NORRIS. Would the Commission care to submit for the record an analysis of the patents that are now owned by the Commission, including an analysis of how many of the patents that are owned are on the direct technics involved in the utilization of atomic energy or the production of special nuclear material?

Mr. MITCHELL. So far as we can do it on an unclassified basis, I am sure we would be glad to.

Mr. NORRIS. What is classified about patents?

Mr. MITCHELL. If you get into an analysis of the relevance you do get into classified information.

Mr. NORRIS. I just want an analysis of the patents themselves.

Mr. MITCHELL. I understood you also wanted their relationship to utilization.

Mr. NORRIS. I want it broken down so you can tell, if you would please, those which are within the atomic energy field that you own and those which are under such things as manipulators, electronics and pumps.

Mr. MITCHELL. I see. Yes sir, we will be glad to do that.

(The information referred to will appear in the appendix in pt. 3.)

Mr. NORRIS. Could you give us the term of the 390 nonexclusive licenses that have been issued?

Mr. MITCHELL. I do not have that here, Mr. Norris. I would be glad to supply it for the record, if you like.

(The information referred to will appear in the appendix to pt. 3.)

Mr. NORRIS. Have standard specifications been set up by the Commission for the issuance of patent licenses pursuant to section 156?

Mr. MITCHELL. We have those, but I am not familiar in detail with what they are.

Mr. NORRIS. They have been established already?

Mr. MITCHELL. Yes, sir, I am quite sure we have——

Mr. NORRIS. Have they been issued and published?

Mr. MITCHELL. I am not sure as to that.

Mr. NORRIS. Will you find that out for us?

Mr. MITCHELL. Yes, sir; I will be very glad to.

(The information referred to will appear in the appendix to pt. 3.)

Mr. NORRIS. Your statement says that the Commission has continued to incorporate its standard patent provisions in contracts and on

the first day of the hearings you stated that the Atomic Energy Act of 1946 required the Commission to use the patent clause it has been using. Do you mind pointing to the provision of the Atomic Energy Act of 1946 that makes this a requirement?

Mr. MITCHELL. I would say rather that section 169——

Mr. NORRIS. Excuse me, you misunderstood me. I asked for the Atomic Energy Act of 1946, which you have been operating under up until August 30.

Mr. MITCHELL. Your question is addressed to whether or not the 1946 act contains a requirement as to patents?

Mr. NORRIS. Yes, sir. A requirement that the Commission take title to any patents.

Mr. MITCHELL. I will have to try to find it. I am not sure that the 1946 act required us to take title to patents except in the sense that certain inventions or discoveries were prohibited from being patented.

Mr. NORRIS. That is not taking title to patent?

Mr. MITCHELL. No, that is not, of course.

Mr. NORRIS. By what right does the Commission retain title to patents under its "C+" patent clause on patents that are other than those used in the production or use of special nuclear material or atomic energy?

Mr. MITCHELL. I think I will have to answer this a little bit at length, if I may.

Our understanding of the act of 1954 is first of all that where Government funds are involved—and this would include our research contracts, our contracts for operations of our facilities, what we know as the cost-plus operations—section 169—no, I am sorry, 159—recognizes that these inventions should be assigned to the United States.

Mr. NORRIS. Excuse me. Does it recognize that they should or does it recognize that you may require them to do so?

Mr. MITCHELL. We may require them to do so.

Mr. NORRIS. This is discretionary and not mandatory?

Mr. MITCHELL. Certainly. But we have had authority and we thought properly we should.

Mr. NORRIS. You are not required to take title?

Mr. MITCHELL. We are not required, but we have done so and thought it was right that we should do so.

I am sorry, as I say, I have to answer this somewhat at length. As to use of Commission facilities where the inventor or discoverer of the particular item has been in one of our laboratories working with our own people, our construction of the present act is that this constitutes an arrangement or relationship with the Commission under section 152.

Certainly, we have authority in that situation under 152 to require to some extent at least that the Government retain patent rights.

There are three aspects to this thing. I have covered funds and facilities. The third aspect is restricted data. Our understanding of sections 152 and 153, that is to say, the sections on inventions conceived under contracts, or other relationships and the compulsory licensing provisions, were both designed to safeguard the Government in a situation where what the Commission has sometimes called the preferred position, what was referred to, in some of the debates, as the inside track, is involved. That is to say, where individuals

by reason of access to restricted data have a position that is not available to the general public.

It has been our understanding that where this is true we should safeguard the rights to the Government and the rights to the public by requiring to some degree a reservation of the patent rights which we, in turn, can make generally available royalty free.

That last consideration, I think, stems largely from section 152.

Mr. NORRIS. Now, let me go back to my question. I was referring solely to the "C+" patent clause. In what instances is the "C+" patent clause used?

Mr. MITCHELL. The "C+" patent clause stems from this third consideration I have just been mentioning. We use it where access to restricted data is involved but where there are no Government funds and ordinarily no Government facilities or at least a very limited use of Government facilities.

Representative DURHAM. For instance, you have contracts with some colleges. It would apply all the way through to the teaching level, would it not?

Mr. MITCHELL. Our study contracts have not been made with universities, but industrial concerns.

Representative DURHAM. How would you handle a matter like this school you are planning to put up where you have students who have access to the laboratory? Would it apply to them?

Mr. MITCHELL. These patent clauses only occur in connection with agreements or contracts. As to Commission and contractor employees we also require patent agreements. But as for a student coming into a teaching institution, we have no contract or other formal arrangement with him, and we have no patent requirements.

Representative DURHAM. You do have a contract for the research problem involved?

Mr. MITCHELL. If we have a research contract with a university where we are spending Government funds——

Representative DURHAM. If a student gets an idea, he is subject to Government control?

Mr. MITCHELL. If he is an employee of a university and he is working on one of our contracts where the contract calls for a research project and we are spending the money on it, then we would use the (*a*) clause which takes everything to us because this is what we are buying. We are buying this particular bit of information. We feel that the patents go along with it.

Representative HOLIFIELD. But where you furnish them some material for their own laboratories—some radioactive material of some kind—and they are not operating on a contract but purely from the standpoint of laboratory research, they are free to do what they want to with that?

Mr. MITCHELL. That is right.

Representative DURHAM. It would not apply to isotope work, would it?

Mr. MITCHELL. No, sir.

Representative DURHAM. Or biology and medicine?

Mr. MITCHELL. No, sir.

Mr. NORRIS. While we are on the point of isotopes, as a slight excursion, didn't the Commission at one time require in the applications

for isotopes that the users give the Commission the right to take the patents on the inventions discovered from their use?

Mr. MITCHELL. I am not familiar with that.

Mr. NORRIS. Will you look that up for the record, please?

Mr. MITCHELL. Yes.

(The information referred to will appear in the appendix to pt. 3.)

Mr. NORRIS. At the present time it does not make that requirement?

Mr. MITCHELL. No, it does not.

Mr. NORRIS. Is it not true that the radio isotope field really blossomed forth as soon as that requirement was removed?

Mr. MITCHELL. I have no knowledge as to that.

Mr. NORRIS. Will the Commission find out?

Chairman ANDERSON. Who would? Somebody must know about it. The staff seems to know all about it.

(The information referred to will appear in the appendix to pt. 3.)

Dr. LIBBY. I think there was a natural growth in this field that has been due to the inherent potentialities in it. I never, as a practitioner in the field, felt that the patents had much to do with the proliferation and development now. It may be that it has had something to do with it. We can look into it. I do not believe it was a major item.

Mr. NORRIS. Perhaps you might ask Mr. Aebersold about this?

Dr. LIBBY. Yes.

Representative DURHAM. The Commission has no intent under the present law to apply such rules and regulations?

Mr. MITCHELL. No, sir, not that I know of.

Mr. NORRIS. I had this question later on because I was going to ask you how much study you had made on the effects of Commission ownership and licensing of patents within your own operations and apparently you have made none.

Mr. MITCHELL. As to compulsory licensing, we have not had occasion yet.

Mr. NORRIS. That is right. If you had occasion, it has not been brought to the attention of the staff and you are not aware of it.

Mr. MITCHELL. What are you referring to now?

Mr. NORRIS. Radio isotopes. Did you have any occasion to study the effect of Commission ownership and Commission retention in rights of patents in others? You have not made a study?

Mr. MITCHELL. The point you mentioned a minute ago?

Mr. NORRIS. Yes, sir.

Mr. MITCHELL. That had not been brought to my attention.

Chairman ANDERSON. They will furnish us a statement on that. Proceed.

Mr. NORRIS. I still want to go back to this very first question that I was starting on, on the "C+" patent clause. This "C+" patent clause is only for use where there is restricted data. This is for instance where there are engineers who want to work in restricted data?

Mr. MITCHELL. I would say it in reverse. We use the "C+" where nothing but restricted data is involved.

Mr. NORRIS. That is right. Then by what right do you retain any rights in patents under the "C+" patent clause which are not used in the production or use of special nuclear material or atomic energy?

Mr. MITCHELL. Sir, under 152, I think we would be entitled to take all the rights if the particular invention or discovery were useful; 152 is stated not in terms of actual use but whether or not it is useful.

So to the extent that we have not taken all the rights we have waived our rights under 152.

Mr. NORRIS. Your statement has made a split between those which are useful in the atomic energy field and those which are not useful?

Mr. MITCHELL. No, I am sorry I did not make myself clear. What I was talking about was not the question of whether the particular invention or discovery is useful, I am talking about the application which is made of it. These are two different things.

Mr. NORRIS. Do you think 152 requires you to do this?

Mr. MITCHELL. No, sir. I think we have the right to waive and we have waived to some extent.

Mr. NORRIS. Again this is not a requirement but this is an exercise of discretion on the part of the Commission?

Mr. MITCHELL. As I read 152, it says the title shall vest in the Government, in the Commission, unless the Commission sees fit to waive. We have seen fit to waive to this extent.

Mr. NORRIS. To this extent?

Mr. MITCHELL. Yes.

Mr. NORRIS. Do you recognize that licenses, under 103 and 104, were intended by legislative history not to be covered by 152?

Mr. MITCHELL. I do not read the legislative history that way, Mr. Norris. You will remember that at one point the bill contained a provision which said that 152 should apply to contracts, arrangements, relationships and the like other than licenses.

If this provision remained, I think it would have meant that 152 did not apply to any license. But this particular limitation was deleted. So as we read 152 now, what it says is that a license may or may not come within 152, depending on the circumstances.

This, I think, is borne out by the statement that Mr. Cole made on the floor of the House in connection with this point. Let me see if I can find this.

Mr. NORRIS. I remember the statement very well. I am trying to get an interpretation on it.

Mr. MITCHELL. This is a statement made on August 9 of last year:

> It is not intended that section 152 should cover licenses unless in some other respects they do have association with the Commission by reason of their being a contractor, subcontractor or having money given to them by the Commission.

Our understanding of this, looking at the purpose of 152 and 153, and the discussions and the history of this reference to licenses, is that if the license is in an unclassified field and no use of Government funds, facilities, or restricted data be involved, then 152 would not apply.

Mr. NORRIS. You are reading the intention?

Mr. MITCHELL. Yes, sir.

On the other hand, if the license carries with it the right of access to restricted data, then it seemed to us that this did come within the purview of 152.

Representative COLE. Mr. Chairman?

For myself, your interpretation of 152 in this regard is incorrect. I do not recall that 152 ever contained the language which you have used "other than as licensee." The statement which I made in the House was intended to be to the effect that the status as licensee is not such relationship with the Commission as to call into play the effect of section 152.

You realize that a licensee or a person having a license has a relationship with the Commission?

Mr. MITCHELL. That is right.

Representative COLE. That is by contract. It is not an arrangement. It is a relationship. It was intended that that fact, standing by itself, a person, having a license, is not such a status or relationship or arrangement as to call into play the operations of section 152.

Mr. MITCHELL. Maybe I did not make myself entirely clear. What I meant to say was that, as you have, the mere fact that an individual has a license or a concern has a license does not in itself constitute a relationship, but it did seem to me that somebody who had a license and who also had access to restricted data—and this access might arise either under the terms of the license or through some other arrangement—if there is access to restricted data the fact that he happens to be a licensee does not preclude the application of section 152.

Representative COLE. I do not think you need to bring in access to restricted data. The mere fact he has a contract with the Commission brings into play 152.

Mr. MITCHELL. The contract might not be the only mechanism by which he obtained this restricted data and the right to it.

Mr. NORRIS. You have said that the lack of statutory standard with respect to the waiver provisions of section 152 creates the problem of determining when it is appropriate to waive the property rights which that section might otherwise vest in the Government.

If the title does vest in the Government when there is no express or implied payment of compensation for the invention, is not that application of the provision unconstitutional?

Mr. MITCHELL. I am sorry; would you read the last part of that question again?

Mr. NORRIS. If the title does vest to the Government by that operation when there is no expressed or implied payment of compensation for the invention, is not that application of section 1952 unconstitutional?

Let me add one more sentence. There are not any procedures established under the act for paying just compensation in those cases, are there? I think the two go together.

Mr. MITCHELL. I don't quite understand your constitional point, Mr. Norris. I would hesitate to say that there is anything in 152 that is unconstitutional. I don't believe there is.

Let me put it this way: We have to attempt to arrive at a construction of 152 which avoids any unconstitutional doubt.

Mr. NORRIS. The Constitution requires that where private property is taken for public use there should be payment of just compensation.

Mr. MITCHELL. Surely. We would have this in mind in construing the section.

Mr. NORRIS. So insofar as you would look for a test for determining how far you are going to waive, would you not waive in those areas where it might be applied in an unconstitutional manner?

Mr. MITCHELL. That might be one criterion but I think there might be others.

Mr. NORRIS. One of the places would be where there is no expressed or implied payment of compensation?

Mr. MITCHELL. That might be one.

Mr. NORRIS. That is all I have.

Representative HOLIFIELD. It would also be a determination of whether or not it was private property.

Mr. MITCHELL. That is right.

Chairman ANDERSON. Thank you, are there any further questions? If not, we will proceed.

Dr. LIBBY. Part VIII, Reactor Hazards and Safety:

NATURE OF HAZARDS

The products of nuclear fission are extremely toxic substances due to their radioactivity. Most of these radioactive materials decay rapidly, but a few persist for many years and accumulate in the fuel elements of a reactor. Some of these materials, such as strontium-90, are far more toxic than chemical poisons.

In the operation of a reactor, the fissionable material is replaced by highly toxic fission products, at a rate directly proportional to the operating power of the reactor. Considering the tolerance limits of certain fission products, it is apparent that one large reactor, in theory, could release sufficient radioactivity to create an important public hazard.

SAFETY CHARACTERISTICS OF REACTORS

Since a remarkable record of safe operation of reactors has been achieved in this country, it is obvious that reactors can be made sufficiently safe for industrial applications. However, this record of safe operation was achieved by very careful consideration of design as well as by meticulous attention to operating procedures. In addition, the location of each reactor has been carefully considered. Perhaps it would be useful at this point to consider characteristics which make some reactors quite safe:

1. Self-regulating features: Most water-moderated reactors, particularly aqueous homogeneous reactors, have the property of self-regulation since heating of the water produces steam bubbles in the reactor core. This introduction of bubbles displaces the water between the fuel elements, thereby automatically reducing the power level of the reactor due to less efficient moderation. Within certain limits of specific power and excess reactivity such reactors can be made essentially foolproof as far as nuclear characteristics are concerned.

2. Reactor safety systems: Much attention is given to the design of all components of a reactor and particularly of the control system so that all components fail safe; that is, if any part of the system fails, the reactor will shut itself down. In the case of reactors to be used for power, such as the submarine thermal reactor, a very high degree of protection is thus obtained, because once installed and adjusted, the controls and the core loading are not rearranged as they are in a reactor used for experimental purposes.

3. Containment: For certain reactors such as the submarine intermediate reactor at West Milton, N. Y., it has been feasible to design a building capable of preventing the release of fission products following the worst foreseeable incident. This approach to the hazards problem appears practical for other reactors such as the pressurized water reactor and the Army package power reactor.

MECHANISMS OF RELEASE OF FISSION PRODUCTS

To evaluate the hazards associated with the operation of a reactor or to design methods of containment, it is necessary to consider all possible mechanisms by which some of the fission products contained in the reactor might be discharged into the atmosphere.

1. Melting of fuel upon loss of coolant: The fuel elements of reactors operated at a high specific power will melt following shutdown of the reactor if not cooled for a long period of time. This results from the energy released in the decay of the fission products. It is, therefore, essential that the primary cooling system be of the utmost reliability. Also there should be provision for emergency cooling.

2. Power transient: If excess reactivity is introduced into a reactor at a sufficient rate, the power of the reactor will increase until the core is disrupted by melting or vaporization of the fuel elements since there is a limit to the amount of heat than can be removed by the cooling system. This characteristic of a reactor places a great burden on the design of the control and safety systems. In certain cases it appears that the introduction of very large amounts of reactivity suddenly can create conditions capable of producing shock waves and violently destroying the reactor core. Fast reactors which are capable of very suddent power surges are particularly susceptible in this regard.

3. Chemical reactions: If a malfunction of a reactor results in melting or vaporization of the core, it appears that certain chemical reactions between reactor components might increase the dispersion of the contents.

4. Enemy action: Sabotage of a reactor or its damage or destruction by a weapon could produce hazards despite all safety provisions in the design of the system.

HAZARDS TO PLANT AND EQUIPMENT

Although protection of the public is the most important consideration in reactor operation, the risk that the reactor will become unusable or that the property must be abandoned also needs to be considered in the overall evaluation of an industrial power reactor. Again, the radioactive materials associated with reactor operation create an unusual situation as compared with usual industrial experience. It is conceivable that the discharge of radioactive materials into a building providing containment could create a condition costing more to correct by decontamination than the value of the property. A noteworthy experience of this type was the Chalk River, Canada, incident in which case the facility was decontaminated, but at great effort. In the case of reactors containing plutonium fuel elements, a much greater risk of loss of use and occupancy would appear to exist than for reactors fueled with natural or enriched uranium.

EXPERIMENTAL PROGRAM

1. Objective: A program has been initiated for the experimental determination of reactor hazards including the actual testing of reactors under transient conditions—conditions of sudden increases in power levels. Some reactors may be tested to destruction. From this program, information will be obtained for the design of reactors with greater inherent safety.

2. Facility and program for transient tests: Steps have been taken to construct a facility for the transient testing and safety determination for various types of reactors. Design of this facility at the National Reactor Testing Station is nearly complete. Adequate instrumentation will be provided to study mechanisms of energy released during reactivity surges. The effects of varying water depth, and reflector construction will be investigated together and other variables so that reactors can be designed to withstand safely sudden reactivity additions. Further reactor tests are planned to include cores proposed for certain research reactors. The continuation of this work will depend, to a large extent, upon obtaining a fundamental understanding of the mechanisms involved in short period transients.

3. Kinetic experiments with a water boiler: North American Aviation has been assigned responsibility for planning an experimental program, constructing a small water boiler reactor of the type planned for university research and conducting an experimental program to determine the maximum amount of excess reactivity that can safely be introduced into such a reactor and the mechanism of self-regulation involved. It is planned that the initial experimental work will start this spring. The site for these tests has not been finally determined. Information on the safe design limits for a water boiler is urgently required for two proposed research reactors.

4. Long-range plans including fast reactor: The proposed design of a fast breeder reactor for location in a populated area requires that the safety of this type of reactor be determined experimentally. This determination will probably require the construction of a reasonably similar prototype in an isolated area and the testing of this prototype to determine kinetic behavior. The site under development at the National Reactor Testing Station can probably be used for the testing of a fast reactor, provided large inventories of plutonium are not involved. The plans for transient tests of a fast reactor are in a formulative stage, but could develop into a major program involving sizable expenditures.

FUSE DEVELOPMENT

At the recommendation of the Reactor Safeguards Committee a major program was initiated at North American Aviation for the development of a self-contained device which can be installed inside a reactor and be capable of shutting down the reactor in event of overheating.

OTHER EXPERIMENTAL PROGRAMS

Experimental investigations have been initiated to obtain information required for a more adequate evaluation of reactor hazards, including such factors as possible chemical reactions between reactor components at high temperatures and conditions leading to melting or burn-out of fuel elements.

REACTOR INSPECTIONS

As a means for follow-up on safety procedures in reactors, subsequent to initial reactor safety determination, an inspection program was initiated last spring. This program includes an annual inspection of each reactor or criticality facility (other than production facil-

ities) and has proved valuable and effective. Some 17 reactors have been inspected to date.

REVIEW OF ACRS ACTIVITIES

The Advisory Committee on Reactor Safeguards has held nine meetings since its organization in June 1953. The membership and functions of this committee have remained essentially unchanged.

It is the policy of this committee to consider each reactor in relation to its surroundings as a special problem. This will probably continue to be necessary until such time as standard types of reactors may be developed.

Chairman ANDERSON. Thank you, Dr. Libby. Mr. Allardice may proceed to question.

Mr. ALLARDICE. You mention on page 7 of that statement that inspection shall be undertaken to assure compliance with regulations.

What agency of the Commission will perform such inspections?

Chairman ANDERSON. That is the third paragraph on page 7.

Mr. NICHOLS. The Reactor Development Division is making those inspections. But under our Inspection Division in the future the Inspection Division will be inspecting all licensees.

We do expect, however, that they will not be making all inspections for all types of things like security and some of the specialty divisions. But they will supervise the overall inspections. So the ultimate responsibility under the new law and under the organization we are setting up comes under the Inspection Division, but the day-to-day inspection may be under one of the divisions.

Chairman ANDERSON. It would be safe to say you are not sure how it will be handled exactly at this time?

Mr. NICHOLS. If it is a licensee it will be covered by the Inspection Division.

Chairman ANDERSON. If it is a Government operation it will be under someone else?

Mr. NICHOLS. Under the Reactor Division. But the Inspection Division will see that from a management point of view they do a good job.

Mr. ALLARDICE. On the Advisory Committee on Reactor Safeguards, is there representation of the insurance type of thinking and the actuarial type of thinking, or is this purely the scientific people?

Mr. NICHOLS. As I recall there is 1 insurance man, Mr. Stratton; 1 individual is from the insurance business.

Mr. ALLARDICE. Does the Reactor Safeguard Committee or the Advisory Committee on Reactor Safeguard, which is the proper title, attempt to arrive at a probability of risk, or do they attempt to simply state under the most adverse conditions conceivable that these risks may occur?

Mr. NICHOLS. They vary from case to case. I think they try to give you some idea—not statistically—of the imminence of a particular risk and what sequence of circumstances need to occur before you need worry about it. Normally the way they work is that they work with the designers and try to make the reactor safe. In other words, if there is some change that could be made in the design to make it safer, they suggest that.

To date it has been the Government reactors only and the ultimate decision is made by either the general manager or the Commission. The Reactor Safeguard Committee is solely advisory. They work with the contractors and our field. But the records come to the general manager level if they are not corrected.

In other words, I expect conditions that are hazardous to be pointed out to me and what steps are being taken to correct them. But you never can say that you can get a reactor 100 percent safe.

Mr. ALLARDICE. I will not press for an answer to this question, but has the Commission ever reversed or taken an opposite position to the Reactor Safeguard's Committee advice?

Mr. NICHOLS. I would say we have tolerated conditions that the Reactor Safeguard Committee has said "let us make safer."

Take a typical one, some type of automatic fuse safer than the one we have. They say "let us work on this." We set up the research and development to do it. But both of us recognize, the Reactor Safeguard Committee and the particular field manager or whoever is responsible for the decision, including the contractor, that you just cannot will something into existence immediately.

So we are constantly striving to keep our good safe record of avoiding accidents.

Mr. ALLARDICE. One further point on that.

Mr. MURRAY. We may not have followed the exact recommendation of the Reactor Safeguard Committee in relation to the slope at Hanford. We made some adjustments there as I recall it.

Mr. ALLARDICE. The point I was getting at, sir, was this: Is it recognized that the advice of this committee can seriously affect the economics of the power program?

Mr. NICHOLS. Yes, sir, it is very much so. That has been in my mind for sometime.

Mr. ALLARDICE. The point of my question as to whether you have ever reversed it was whether the Commission exercised independent judicial scrutiny of these advices given to it?

Mr. NICHOLS. I think the answer is "Yes" to that. Also I have talked to the Reactor Safeguard Committee and said "Have you really analyzed this as to what is a common-sense solution here?" It is something which I do not feel that we have a happy solution to, yet, because any group that is set up to point out hazards tends to point them out.

Mr. ALLARDICE. Exactly.

Mr. NICHOLS. That keeps their record clean. It is always a job of management, you might say, in this case ultimately the Commission, to take what can be considered a calculated risk.

As I said before, you never can make a high-power reactor 100 percent safe. There is always a possibility that some sequence of events or mistakes in operation can have some type of accident, maybe minor or maybe major.

Mr. ALLARDICE. Do you believe that the attitude and the recommendations so far of the Advisory Committee on Reactor Safeguard has had a deterring influence on insurance companies?

Mr. NICHOLS. Yes. I personally feel they have been a little too conservative. We have been lucky in having a safe record. Everyone involved wants to keep it safe. In other words, they do not want

to be involved in a recommendation that might ultimately lead to an accident.

Statistically, some day we ought to have an accident. As long as there is a one-in-a-million chance you may get that millionth chance some day. I think the fact that we have had such a safe record really tends to create a degree of safety which is beyond what has been normal industrial practice. But there is argument for that.

However, in normal industrial practices you have a risk so that if you have an accident it only extends so far, whereas some of our risks are so much bigger.

It is again a case of judgment. We are right now arranging for the chairman of the committee to spend more time on solving this problem. We do have to get more insurance people in to get statistical data. It is one of the real problems of permitting and encouraging the atomic industry to develop. That is, this problem of safety.

I have recognized and I think the Commission has recognized it is a most serious problem.

Chairman ANDERSON. Thank you Dr. Libby.

Are there any further questions? If not we will proceed to topic X. The committee will recall that topic IX was taken out of order.

Mr. NICHOLS. Part X, International Assistance Program: The President's historical proposals that there be international collaboration in order to promote the peaceful benefits of atomic energy have been received with enthusiasm throughout the world. Important actions have taken place in the past months to initiate the atoms-for-peace program. Negotiations have been undertaken by the Commission with three friendly countries toward bilateral agreements under the new act for cooperation in peacetime uses. The United States proposal that there be an international scientific conference to discuss the peaceful applications of atomic energy received the unanimous approval of the General Assembly of the United Nations and this conference will be held in August of this year in Geneva, Switzerland. Negotiations are underway to establish an International Atomic Energy Agency. We have taken specific steps to provide interim information and training programs pending the establishment of this Agency. The Commission will continue to work with the Department of State in advancing these great objectives of the President.

BILATERAL AGREEMENTS

In the past several weeks Commission officials have held conversations with representatives from Belgium, the United Kingdom, and Canada for the purpose of developing bilateral understandings pursuant to sections 123 and 144a of the Atomic Energy Act of 1954.

INTERNATIONAL CONFERENCE ON PEACETIME USES OF ATOMIC ENERGY

On Monday, April 19, 1954, Chairman Strauss announced that it was the President's intention to arrange an international conference of scientists to discuss the peaceful uses of atomic energy.

On December 4, 1954, the General Assembly of the United Nations approved a resolution which, among other things, directed the Secretary General, in consultation with an advisory group composed of representatives of Brazil, Canada, France, India, the U. S. S. R., the

United Kingdom, and the United States, to issue invitations to an international conference on peaceful uses of atomic energy. The Secretary General was also directed to prepare and circulate to the interested nations a detailed agenda for the conference and to provide the necessary staff and services.

The President designated Dr. I. I. Rabi, Chairman of the General Advisory Committee to the Atomic Energy Commission, to be the United States representative on the Secretary General's advisory committee.

At the first meeting of the advisory committee in New York on January 17, the representatives from the seven nations began to develop recommendations on a detailed agenda and general organization. Geneva, Switzerland, was selected as the site and August 8, 1955, as the date of the first session.

INTERNATIONAL ATOMIC ENERGY AGENCY

In an address before the General Assembly of the United Nations on December 8, 1953, the President proposed a program of far-reaching importance for the development of international cooperation in the peacetime uses of atomic energy.

The form of the international organization, which will be established to implement the President's proposals, is presently under study by the State Department.

PROGRAM FOR INFORMATION AND TRAINING

In the meantime the Commission has considered a number of actions to be undertaken by the United States. These are as follows:

REACTOR TRAINING SCHOOL

This school will be opened on March 14, 1955, at Argonne National Laboratory. It is planned that up to 34 foreign and 8 United States students and scientists will be accommodated at the first course, which is expected to last approximately 7 months. The second course, which will probably be a 9 months' course, will be similar to the first and will begin late in November 1955, with accommodations for up to 50 foreign and 30 United States students and scientists. The courses, which will be unclassified, will include lectures, laboratory work, and actual work with reactors, their components and associated facilities. At a later date it is anticipated that classified reactor technology courses may be established, the enrollment for which will be limited to nationals from those countries with whom cooperation agreements have been negotiated in accordance with the Atomic Energy Act of 1954.

ISOTOPES HANDLING SCHOOL AT OAK RIDGE

Since October 1948, a limited number of students from other countries have been permitted to attend the unclassified training courses in the use of radioisotope tracer techniques conducted by the Oak Ridge Institute of Nuclear Studies. Foreign student participation in the studies at the Institute has been limited to students from those countries registered to receive radioisotopes from the Commission.

if their attendance would not prevent the attendance of a qualified United States citizen and provided that the student met other specified qualifications. The Commission has now approved a special 4-week isotopes course for approximately 30 foreign students to begin May 2, 1955, and subsequent special courses will be offered if necessary. Foreign students will be admitted to the scheduled course in 1955 up to 15 percent of the total enrollment.

TRAINING COURSES IN THE UTILIZATION OF ATOMIC ENERGY IN THE FIELDS OF BIOLOGY, MEDICINE, AND AGRICULTURE

Training in industrial medicine and hygiene and radiological physics, courses for which have been administered by the Commission for the past several years, is indispensable to the operation of reactors and in the use of radioactive materials by friendly foreign nations. The Commission is therefore prepared to adapt the existing programs, which are largely unclassified and which can easily be completely declassified, to accommodate 20 to 30 foreign students per year. Short courses in the theory and use of radiation instruments will also probably be established to accommodate 30 to 40 foreign students per year. In the areas of biological and general medical applications of atomic energy, plans are being developed for the participation of practicing physicians and scientists in unclassified research at our major laboratories, such as the agricultural research program at Brookhaven and the cancer research at Argonne Cancer Research Hospital. Short unclassified orientation courses in radiation medicine, including cancer, to be broken up into specified short stays at various institutions and laboratories in the United States, are proposed for 60 or more foreign participants per year. The Commission has authorized the negotiation of arrangements with the institutions concerned for the conduct of these biological and medical programs, and the possibilities of obtaining financial assistance from other Federal agencies for support of these programs are being explored.

TECHNICAL LIBRARIES

To make available research material on atomic energy libraries of unclassified documents have been assembled. These technical libraries consist of approximately 6,500 nonclassified reports of which 1,600 are full-sized reports and the remainder microcards. In addition, there are included Commission nonclassified nuclear science abstracts, bibliographies, special reports and a set of unclassified catalogue cards. The libraries are to be presented to foreign nations in exchange for similar materials.

ROLE OF AMERICAN INDUSTRY

It is contemplated that with respect to the furnishing of equipment, facilities, and materials (other than special nuclear materials), United States industry will play a major role in implementing agreements for cooperation.

As permitted by the Atomic Energy Act of 1954, it is the intention of the Commission that all agreements for cooperation with other governments shall provide for industry to supply equipment, facilities, services, and materials (other than special nuclear materials) to

the extent that such activities fall within the scope of the particular agreement.

Under the act a license issued by the Commission is required for the export of production facilities, utilization facilities, source materials, and byproduct materials. The Commission is now formulating licensing regulations. In the formation of these regulations and in discharging its licensing functions under these regulations, the Commission will be guided by the principle of facilitating industry's participation in the arrangements for cooperation with other governments to the fullest extent permitted by the act.

To assure to the extent possible that only such classified information as falls within the scope of the agreement for cooperation is communicated to another government, the Commission contemplates requiring that whenever the furnishing of materials, facilities, or services by industry involves the communication of classified information outside the United States, these transactions must be approved by the Commission.

Chairman ANDERSON. Thank you, General Nichols. Mr. Allardice may proceed to question.

Mr. ALLARDICE. In your last paragraph you point out that industrial activities overseas are subject to approval of the Commission, which is in accord with the language of the law, I believe. Have you established procedures for industry to apply for activities overseas?

Bear in mind I am not referring to international arrangements. These are the unclassified activities.

Mr. NICHOLS. We have in cases of application, where companies have submitted that they want to do a particular job overseas. We have given approval in some specific cases.

Mr. ALLARDICE. Have you approved any such today?

Mr. NICHOLS. If you consider Canada, yes. We have one that I know of that we have approved. I think we have another one pending, do we not?

Mr. MITCHELL. We have approved several on an individual basis, Mr. Allardice, and what we are planning to do is to publish regulations on the form in which those who wish to engage in these activities may make applications to us.

Mr. ALLARDICE. But in the interim you have not indicated that if you apply we will approve or can approve or will entertain applications?

Mr. MITCHELL. Whenever anybody has come to us and said we are worried about this and want to go ahead, we have explained to them what they can do.

Mr. ALLARDICE. You will have regulations forthcoming?

Mr. MITCHELL. The regulations as to the information that we will need in order to make a determination where a question like this arises.

Mr. ALLARDICE. One of the problems that American industry has expressed itself on is the matter of promoting its ability to provide services overseas. How have you approached this problem?

Mr. MITCHELL. What comprises engaging in production is the difficulty.

Mr. ALLARDICE. That is what industry finds. I wonder if you have found any mechanism either formally or by simple notice that you would like to talk to them about the problems?

Mr. MITCHELL. Whenever one of these situations comes to our attention we try to alert the firm involved that a question under 152 may be involved.

Chairman ANDERSON. Why do you want to alert them? Do you want to worry them?

Mr. MITCHELL. No; because they may be in violation of the law if they do not come to us and get approval.

Chairman ANDERSON. It would be only a violation of the law if you construe they were not under it.

Mr. MITCHELL. I think it is up to the courts as to what 157 (a) means and criminal penalties are involved.

Mr. NICHOLS. They know we can waive it.

Mr. MITCHELL. We can authorize the particular activity in which case there is no violation. The question basically is: Does this section apply to this activity?

Mr. ALLARDICE. The point I was trying to make, and apparently did not make too successfully is this: Have you attempted to explain in any public way to industry that you will entertain such proposals and you are willing to waive under some conditions, preceding to the formal rules and regulations you might issue?

Mr. MITCHELL. No, sir.

Mr. ALLARDICE. Have you attempted to encourage this or have you by no action tended to discourage it?

Mr. MITCHELL. I would not say we have discouraged by failure to act. I think anybody who is interested in this thing can always come to us and they have.

Mr. ALLARDICE. Those are the two I have on that section.

Mr. NICHOLS. We have many informal queries on this type of thing. We know that a good many concerns are all all out searching the foreign market to see how they can get business.

Mr. ALLARDICE. Have they done this with approval of the Commission?

Mr. NICHOLS. Many of them have indicated they are doing it. I recall a letter the other day that stated, "We want to explore in an unclassified way, and we will be coming back if we find we have some business as to how to go about it."

Chairman ANDERSON. Are there any further questions? If not we will proceed with topic XI.

Dr. LIBBY. Part XI, Training of Scientists and Engineers for Atomic Energy Industries:

Estimate of the magnitude of future demand: The rate at which atomic energy can be adapted to human needs will depend upon the scientific and engineering manpower available to solve the technical problems. Approximately 14,000 scientists and engineers are now employed by the Commission and its prime contractors. In addition, about 4,000 scientists and engineers are engaged in research and development in related fields in universities and industrial laboratories. These 18,000 scientists and engineers working in the atomic energy program comprise about 2 percent of the 850,000 engineers and scientists in the United States in all fields.

Our estimates of the future demands for trained scientists and engineers are based on the forecast that 12 million kilowatts of electrical power will be generated by atomic energy in 1957. Dollarwise and in

terms of manpower requirements the power program in 1975 will equal the total present program of the Commission including weapons, production, and military propulsion. On this basis we can foresee the need by 1975 for 40,000 scientists and engineers for atomic energy work.

To achieve such a goal the training program must be increased by 1975 to an annual level of 4,000 new scientists and engineers per year. At present we are probably training 1,500 per year of the type here considered.

In addition to the demand in this country, a large potential demand for trained scientists and engineers in this field exists and will exist throughout the world. In fact, it is entirely possible that higher power costs in Europe and elsewhere, will create a greater demand for men trained for atomic energy development outside than in the United States. The United States will be expected to assist in this training because of its present preeminence in the field. The program for the next 2 years reported earlier under international cooperation is a start toward this end.

How do we expect to accomplish this training job? The American universities are now providing and will continue to provide training in the basic sciences and engineering. As time progresses and more information is declassified the universities can be expected to develop more highly specialized courses, and finally to take the entire responsibility. In the next 4 or 5 years the Commission will assume an important role in conducting training programs in fields not now included in university curricula.

The Commisson's direct contributions to the training of scientists and engineers fall generally into three categories:

(*a*) Employment of candidates for masters and doctoral degrees under the university research contracts.

(*b*) The employment of, and use of facilities by, advanced students and on-leave faculty members from universities at our national laboratories.

(*c*) Special training programs.

UNIVERSITY RESEARCH CONTRACTS

Through the Divisions of Research, Biology and Medicine, and Reactor Development, the Commission supports fundamental research in fields related to atomic energy on a cost-sharing basis at universities and independent research institutions. The educational employment opportunities afforded by these contracts enable many students to pursue graduate work. Frequently the contract provides both stipend and subject matter for a dissertation. In every case the contract has provided facilities and supplies which have enabled the university to expand and improve its program of postgraduate instruction.

In the physical sciences, approximately 300 research contracts are active with 90 universities. Thees provide employment for an estimated 1,600 graduate students in the fields of chemistry, chemical engineering, physics, and metallurgy, of whom about 500 receive their Ph. D.'s or master's degree each year. These represent about 30 percent of the total of advanced degrees awarded each year in the physical sciences in the United States and a much higher percentage of

those in the specializations which are most directly related to atomic energy.

In the life sciences, including medicine, biophysics, biology, and agriculture, approximately 389 research contracts are supported at 184 universities, hospitals, and research institutions. Under these contracts, about 320 graduate students are given full or part-time employment.

GRADUATE TRAINING AT AEC LABORATORIES

The research programs conducted at AEC laboratories (Brookhaven, Argonne, California, Ames, Rochester, and Oak Ridge) also contribute materially to the training of scientists through the use of facilities and participation in the programs by students working on dissertations. The number of such students is 235 in the physical sciences and 35 in the life sciences. About 100 of these receive an advanced degree each year.

RESEARCH PARTICIPATION

Many of our national laboratories also engage in university research participation programs under which university faculty members are employed in AEC laboratories for occasional periods ranging between 3 and 12 months. The participants are given an opportunity to use modern equipment and to become familiar with the national-laboratory problems and methods. The AEC laboratories have also taken a lead in organizing topical research conferences, special short-course training programs, and study groups. The effect of all of these activities on both quality and number of students trained is substantial but cannot be expressed in numbers. About 250 university faculty members now participate in these programs at our various laboratories.

SPECIAL TRAINING PROGRAMS

Fellowships: To train the specialists needed in its own program the AEC offers 55 fellowships for 1 year of study in radiological physics, industrial hygiene, and industrial medicine.

Training in the use of radioisotopes: Since 1948 the Oak Ridge Institute of Nuclear Studies under an AEC contract has been offering basic and advanced courses in radioisotopes techniques. These courses teach the use of radioisotope techniques for research and for the problems of industry. About 200 people are trained each year in a basic course of 4-week's duration, and 250 individuals received advanced training in 1 of 3 advanced courses of 1 or 2 weeks' duration.

Reactor technology schools: The Commission established a school of nuclear reactor technology at Oak Ridge in March of 1950 with a group of 18 special students selected from industry and Government.

The school was expanded in 1951, and at the present time 80 students are attending. The Oak Ridge School of Reactor Technology (ORSORT) is a terminal school for students who have completed their university work. The alumni of ORSORT now number 290. All are engaged in the atomic-energy program either in the Government or industry.

As already stated in the section on the international cooperation program a school of nuclear science and engineering will open in March 1955 at Argonne National Laboratory. This school will present unclassified scientific and technical courses on nuclear reactors and related matters. The school, planned to accommodate 80 students, will serve engineers and scientists from the United States and abroad.

ON-THE-JOB TRAINING AND INDUSTRIAL STUDY GROUPS

The Commission recognized sometime ago that the opportunities for proper training of engineers in nuclear technology was limited. As a consequence, in addition to the other types of training programs discussed previously, a program of on-the-job training has been established.

Under this plan, experienced engineers from industry are assigned to a Commission laboratory or facility usually for a period of 1 year. These assignments may be as a consequence of a consultant contract, a personnel loan or other suitable arrangement. While at the laboratory, the engineer is an active participating member of a group working on a particular design, development, or operating problem. He contributes his skill and industrial experience. At the same time he acquires the know-how and technology unique to nuclear energy utilization. He has access to the classified literature and he acquires skills not otherwise available. At the completion of his assignment, he returns to his industrial employer.

At the present time, some 200 such engineers are working in Commission facilities on Commission programs, representing some 90 United States industrial concerns or other Government agencies. To date 165 engineers have been trained for American industry under this program. A table summarizing these activities is attached.

In addition to those trained through the on-the-job training program and those trained by our reactor schools, some 350 technical personnel from industry have been trained from the 18 active industrial study groups. This training has largely been self-training. These representatives of industry have been cleared for access to classified information. Then through study of the literature, visits to AEC facilities, attendance at classified symposia and seminars, and discussions with AEC scientists and engineers, these industrial engineers and scientists have been developing the necessary working familiarity with this new nuclear technology.

CANCER RESEARCH

At the Argonne Cancer Research Hospital, the ORINS Medical Division, and at the BNL Medical Center, training is given in cancer research techniques using isotopes and nuclear radiations. Approximately 25 individuals are currently receiving such training.

Chairman ANDERSON. Thank you, Dr. Libby. Mr. Allardice, you may proceed to question.

Mr. ALLARDICE. What efforts has the Atomic Energy Commission made to get the necessary training done in normal institutions of learning?

Dr. LIBBY. We have been rather worried about having this course be very valuable to the students. It is possible to teach the theory—at

least the physical theory of reactors—in any college or university at the present time. We have considered that our school here should do more than that. That means that it should offer laboratory experimentation involving reactors. So we have been rather limited to those schools and those facilities where reactors exist.

It is primarily for this reason, at least in my mind, that we have been forced to have these schools at our own facilities. But I do not believe there is any determination that this should continue in the future when some of the reactors being built now at schools and universities are finally completed.

We are very proud of the program that is being developed at the Argonne Laboratory. We hope it will be very successful and be a good model for future schools in the unclassified aspects of reactor technology.

I believe you have been furnished this brochure from the school. It looks very promising.

Representative DURHAM. How do you select the students, Doctor?

Dr. LIBBY. Can you answer that, General Nichols?

Mr. NICHOLS. You can answer that, Mr. Davis.

Mr. DAVIS. For the Argonne School there has been a committee set up composed of people from Argonne and from the AEC staff to select the students for the school. This committee is having meetings during this current week.

Representative DURHAM. On what qualifications?

Mr. DAVIS. Based on their academic qualifications and their experience.

Represenative DURHAM. Are you going to take anybody with just an ordinary course in physics?

Mr. DAVIS. No, sir; I do not believe so.

Representative DURHAM. It looks like you would have to have some criteria.

Mr. DAVIS. Our criteria are a bachelor's degree in one of the physical sciences.

Representative DURHAM. He has to have a bachelor's degree before he can make application to this school?

Mr. DAVIS. Or the equivalent in experience.

Representative DURHAM. Let us go a little bit further. How are you going to pay these people? Can you give us that information? Who is going to pay the expense?

Mr. DAVIS. The expenses will be paid by the country sending the person. We are making no arrangements as far as their expenses are concerned while they are at the school.

Representative DURHAM. You are not making any arrangements. You do not know whether they are going to get any compensation at all?

Mr. DAVIS. Whether the students will?

Representative DURHAM. Yes.

Mr. DAVIS. The students presumably will be paid by the country or the organization sending them.

Representative DURHAM. Paid out of what funds?

Mr. DAVIS. Out of their own funds.

Mr. NICHOLS. There may be some FOA.

Representative DURHAM. I want to know definitely. Somebody ought to know if you are going to go into this thing. We might as well get the facts on this.

Mr. DAVIS. I am sorry I don't know the answer as to whether it will be provided or not.

Mr. NICHOLS. Can we get the answer to that?

Representative DURHAM. Before final arrangements are made completely on the finance and the acception I think it would be well, Mr. Chairman, to have in detail for this committee as to the qualifications, what it is going to cost, and what funds it is going to be paid from.

Chairman ANDERSON. Will you supply the information which he has asked for?

Mr. LIBBY. Yes, sir.

(The information referred to follows:)

ARGONNE NATIONAL LABORATORY INTERNATIONAL SCHOOL

In accordance with the announced policies of the United States Government, the Atomic Energy Commission will open a school of nuclear science and engineering at the Argonne National Laboratory on March 14, 1955. The school is to serve engineers and scientists both from the United States and abroad by providing a facility where training in the field of nuclear engineering is available. The school was initially set up to handle 30 students, 20 from abroad and 10 from United States industry. However, due to the large response, plans are being made to accept approximately 42 students. This program is temporary in nature until such time as American universities are equipped to assume this task. No degrees will be given and it is not expected that the course will ever be longer than 1 year.

TUITION

The first course will be of 7 months' duration. A tuition fee has been established which will, in the case of the American students, return direct operating costs. Indirect operating costs and capital costs of the school will be absorbed by the Atomic Energy Commission. For this first course, a tuition fee of $1,500 has been established for students from American industry. A nominal fee of $500 has been established for foreign students. FOA assistance will be given to foreign students. The FOA assistance varies, but will cover overseas and domestic travel, per diem, and reimbursement of AEC for the $500 tuition. No salary or other remuneration will be included in FOA assistance. On the basis of the latest available information, only eight foreign students will not be receiving FOA assistance for the first course.

STUDENT REQUIREMENTS

The school will attempt to meet the individual needs of the students to the greatest extent possible. However, it is necessary that all persons attending the school have a good working knowledge of the English language and a bachelor's degree in one of the physical sciences or in engineering or its equivalent in experience. An understanding of applied mathematics through differential equations will be assumed, and experience in use of engineering drawings would be helpful, although not a requirement. Each student should be between 22 and 35 years of age. A selection board composed of representatives from the Argonne National Laboratory, the Department of State, FOA, and the Atomic Energy Commission reviewed the applications and made the selections.

FOREIGN STUDENTS

Twenty-five countries were invited each to nominate two candidates to participate in the first course at the reactor training school. As of this time, 41 nominations had been received, 32 from countries to which invitations were extended and 7 from countries which knew of the school and sent in nominations even though not expressly invited. No nominations were received from the following countries: Chile, Columbia, Peru, Venezuela, Italy, South Africa, Korea,

India, Lebanon, and Turkey. However, all of these countries indicated that because of the short time available they could not nominate a student for the first course but were planning to nominate students for the course beginning in the fall of 1955.

The Department of State felt that at least 1 candidate from each country which submitted nominations solicited (or unsolicited) be accepted and in most cases more than 1 should be accepted. All foreign candidates met the educational requirements for admission. As a consequence, the selection board agreed to accept 33 students from abroad.

DOMESTIC STUDENTS

Seven hundred and fifty American industrial firms were each invited to nominate a candidate for this school. As of this time, 12 applications have been received. A review of the applications indicated that all nominated candidates from American industry met the minimum qualifications for attendance. However, it appeared that a number of the candidates could perhaps obtain more useful background and knowledge if they were to participate in the on-the-job training program at Argonne rather than by attendance at the school. As a consequence, the Division of Reactor Development is contacting these individuals and will discuss with them the relative advantages of on-the-job training arrangements. It is anticipated as a result of favorable reaction to this alternative proposal that only approximately eight American students will attend this school. It has been determined, however, that if the sponsoring institutions do not feel they desire a cooperative on-the-job training program, these students can be accepted for admission to the school.

ORIENTATION OF FOREIGN STUDENTS

The first classes of the school will start on March 14, 1955, at Argonne. However, all foreign students will assemble in Washington on March 7 for 1 week's general orientation. The FOA will meet all the foreign students on arrival in the United States and arrange for their transportation to Washington. During the week in Washington, a number of activities to help orient these students are planned. The AEC will interview these students during the week in Washington to obtain additional biographical data, additional information with respect to housing requirements, health, histories, etc. A proposed information plan and program is being developed and will be available shortly. During their stay in Washington, the students will probably be housed at the Presidential Hotel.

It is tentatively planned that the students will leave Washington on March 12, probably on the Capitol Limited, and in a body go to Chicago. On arrival at Chicago, the students will be housed at the International House for the duration of the course. However, if any student desires separate living accommodations, they can be secured on his own initiative. It is understood that foreign students will not be accompanied by their families.

SECOND COURSE

The timetable for the second course to start late in the fall of 1955 has been considered. We expect from 100 to 120 applicants from abroad for the second course and we are prepared to accept in the neighborhood of 80 to 90.

MISCELLANEOUS

There is an urgent need for facilities at the Argonne National Laboratory, in which to accommodate the training activities of the new school. AEC is exploring ways and means of meeting this need.

It is anticipated that the new school will meet at least partially the needs for training in the field of reactor development until colleges and universities in the United States undertake expanded curricula.

No formal plan of grading or examination is planned as part of the school. Closing exercises, however, will probably include presentation to the students of a certificate indicating that the student has completed the course.

Representative DURHAM. Are you going to issue him some kind of certificate of qualification after he has taken this course or is he just coming here to take the course?

Mr. LIBBY. I don't know that we have determined that.

Mr. NICHOLS. I think generally in practically all of our schools we give some type of certificate when they have completed the course.

Mr. DAVIS. In the Oak Ridge Reactor School they are given a certificate.

Representative DURHAM. Will this be run by the Commission or the State Department?

Mr. NICHOLS. The school will be run by the Commission. Where the students come from is a cooperative venture.

Representative DURHAM. Between you and the State Department?

Mr. NICHOLS. Yes, sir. Our end is to set up the facilities and instruction.

Representative DURHAM. I have no objection to it but I do want to know something about it.

Mr. NICHOLS. This is one where various departments are cooperating and it is not all jelled.

Representative DURHAM. I know you say this will not anticipate any classified reactor technology courses.

Doctor, I am at a loss to understand why this cannot be done in the institutions of this country in view of that statement.

Mr. LIBBY. The difficulty at the moment, Mr. Durham, is that there is no school, I believe—I believe this is correct—which has the facilities for experimental work on reactors that are contemplated in the unclassified course being offered here at the Argonne Laboratory. It should not be very long, I think, before there will be some schools. I believe it is true at the present time that there is not a single school in the country which has the facilities.

I can give you examples, if you wish, of the type of thing I mean. I don't know whether it would be helpful or not.

Representative DURHAM. I am just wondering, of course, when you once get a thing like this started how easy it is to grow like mushrooms. We face difficulty in giving proper instruction in this field in the colleges of the country at the present time.

I want to express my own opinion at the present time: I hope the Commission does not want this to grow into a full-grown blown-up college course of 4 years. You started off with 7 months here. If the Commission can assure me for my own purpose that it is not going beyond a certain limit in this thing, I have no fears of it. But I do have fears otherwise.

Chairman ANDERSON. I think we could get an expression from them today and that will be binding until it is reversed.

Mr. LIBBY. We have not made a formal determination on this point, Mr. Durham, but I believe it is the sense of the Commission that we are not in the school business any more than we have to be to further the whole objective of obtaining atomic power.

In other words, when the schools can take over, it would be my position that they should.

Representative DURHAM. My fear is brought about by this fact. You know that a commission changes and we have different type personnel in Government agencies from time to time. Naturally I do not feel that it is the place of Government to be educating people in this field of basic science.

Mr. LIBBY. We can certainly agree to watch this.

Chairman ANDERSON. Let us know if there is a change in plans.

Mr. LIBBY. Surely.

Representative DURHAM. Are you going to limit this entirely to the foreign students?

Mr. LIBBY. No. We have 60 percent foreign and 40 percent American.

Representative DURHAM. If those students are subsidized out of funds that are appropriated by the American Government, I want to say further, Mr. Chairman, I feel we have to do the same thing for the individual here in America. That is something for you to think about. I think they are entitled to the same thing.

Mr. LIBBY. I would like to add one more thing, Mr. Durham. I don't want to let the record show that this is the first course on reactor technology.

Representative DURHAM. I realize that. This is the first time we have had a chance to get at it.

Mr. LIBBY. Yes, sir. We have had for a number of years a course at the Massachusetts Institute of Technology and other schools throughout the country teaching the basic theory without laboratory experimentation. But in this, laboratory experimentation is so important——

Representative DURHAM. We can also have the excuse that we have the finest laboratories in the world and therefore we want more scientists and get a little farther in this field.

I want to be clear here that we are not in this thing from the standpoint of competition with the graduate courses of the colleges of this country. I think you will agree with me on that.

Mr. LIBBY. Yes, sir; I personally agree completely.

Chairman ANDERSON. Are there any more questions? If not, Dr. Bugher will proceed with topic XII.

Dr. BUGHER. Part XII, Use of Reactors in Medical Therapy and Research: One way in which atomic energy can be of direct benefit to individual members of the public is through the use of reactors in medical therapy and research. Medical reactors offer special advantages over other forms of radiation therapy. Reactors may be utilized in medicine because they are a source of a special form of radiation; namely, neutrons.

In 1895 Roentgen first determined that X-rays were useful in medical diagnosis. Shortly thereafter, Leopold Freund of Vienna made what may well have been the first attempts to utilize X-rays in therapy.

It is now recognized that ionizing radiations can be employed successfully in destroying abnormal cells characteristic of various forms of malignancy in man and animals.

The history of radiation therapy since the turn of the century has been one of continuous quest for more penetrating and more energetic as well as more accurately applied radiation. X-rays, radium, and various radioisotopes have had a significant role in the study and treatment of human diseases. However, there are certain types of deep-seated malignancies which cannot be treated satisfactorily by common methods of radiation therapy. For these, a form of radiation is needed which will penetrate through bone and tissue to reach the malignancy without at the same time damaging healthy tissue, especialy superficial tissue, such as the skin.

As radiation increases in energy, its penetrating ability increases, and it causes less damage to the skin. Neutrons which are expelled

from the nucleus of an unstable atom are extremely penetrating, and for this reason have special utility in medicine. The neutrons do not directly affect the diseased tissue. Rather, they are used as a means of bombarding atoms previous introduced into the area of malignancy.

Pioneer work in neutron therapy has been done at Brookhaven National Laboratory for treatment of brain tumors. The treatment begins with injection of a solution of boron into the patient's bloodstream. The boron initially concentrates in the tumorous tissue to a greater extent than in normal brain tissue. The patient is placed near a properly screened port of the reactor, so that when the port is opened a beam of neutrons is directed to the tumor site. As the boron atoms are hit by this powerful neutron beam, they split into alpha particles and lithium nuclei. It is these particles which destroy the tumor cells. Since their range of penetration is very short, they cause little damage outside the tumorous area.

The response of some of the patients to this treatment has been impressive, although in all cases the improvement has been temporary.

The key to the process described above is an adequate source of neutrons.

Because of the localized irradiation resulting from neutron capture, the biological efficiency of a given amount of neutrons greatly exceeds that of any other form of radiation.

A nuclear reactor provides a source of neutrons of the required energy and intensity.

ADVANTAGES OF MEDICAL REACTORS AS NEUTRON SOURCES

The advantages of reactors over other sources of neutrons, such as high-powered accelerators are: (1) Lower cost; (2) lower maintenance upkeep; (3) greater operating facility; (4) greater dependability; (5) other dividends from reactor operation, such as the production of radioactive byproducts.

NEED FOR ESPECIALLY DESIGNED MEDICAL REACTORS

Unless the reactor is designed for and assigned to the medical department of a laboratory, its diversion to medical therapy is at the expense of other departments. In the case of the reactor at the Brookhaven National Laboratory, the reactor must be completely shut down 24 hours in advance of the irradiation in order to control the amount of radiation the patient is to receive. Consequently all experiments, biological and physical alike, must be interrupted in order to accommodate the medical department. Another disadvantage is that the upper platform of a pile designed for purposes other than medical therapy is hardly an efficient operating room.

For these reasons, it became apparent to the AEC about 2 years ago that especially designed medical reactors were needed. Atomic energy reactors of the flux necessary to meet production and physical research criteria are far too costly and cumbersome for medical use. The size of such reactors makes it undesirable or impracticable to locate hospital facilities adjacent to them. On the other hand, separation of the hospital site from the reactor exacts another penalty; the use of precious short-lived isotopes in the medical department is made impossible or impracticable. For example, in order to treat a patient

with radioactive chlorine, with a half life of 37 minutes, it has been necessary at Brookhaven National Laboratory to provide a special escort for the material from the reactor to the hospital site, some 2 miles away, in order to get it to the patient while it is still radioactive.

CHARACTERISTICS OF MEDICAL REACTORS

At least two designs of medical reactors are available. Both are of the water-boiler type. Such reactors, exclusive of the buildings which house them and the shielding around them, are about 8 cubic feet in size. They may be expected to generate neutron field densities of upward of 5° by 10° (50 billion) thermal and epithermal neutrons per square centimeter per second. Such reactors provide considerable versatility in therapy. Irradiation may be scheduled in accordance with the patient's condition, rather than competing with other programs for available reactor time. By design, the reactor's neutron beam can be directed to any tumor site in the patient. Moreover, it is so designed that a patient's irradiation can be carried on at one face of the reactor while biomedical experiments and the production of isotopes can be carried on at other locations. Particularly attractive to the medical scientists is the prospect of immediate availability of such coveted short-lived isotopes as manganese^{56} (2.6 hours); krypton^{85} (2.8 hours); and chlorine^{38} (37 minutes).

TRAINING OPPORTUNITIES WITH MEDICAL REACTORS

Medical reactors have an important contribution to make in the national and international training programs. All phases of nuclear biophysics can be studied and taught. Equally important, physicists, scientists, health physicists, industrial hygienists, and technicians can become versed in hazard control, in the health and safety aspects of reactor operation and in the handling of radioactive materials and wastes.

AVAILABILITY OF MEDICAL REACTORS

As mentioned above, at least two designs for medical reactors are presently available. The Commission has approved for inclusion in the fiscal year 1956 budget an item for the construction of a medical reactor at Brookhaven National Laboratory.

Chairman ANDERSON. Thank you, Dr. Bugher. Mr. Allardice, you may proceed to question.

Mr. ALLARDICE. Is the Brookhaven National Laboratory medical reactor to be let on cost-plus or a competitive basis?

Mr. NICHOLS. Do you have the answer to that, Dr. Bugher?

Dr. BUGHER. Yes; I can give the answer as it stands today. The design of that reactor is being developed partly by a contract with an outside firm and partly by the staff of the Brookhaven Laboratory. When it comes to construction in connection with the proposed medical center, it is contemplated that there will be two competitive bid propositions. One will be for the construction of the building and the housing of the reactor, and the second for the reactor itself.

It would not follow that the same construction company would get both of them, of course.

Mr. ALLARDICE. The reactor will be let on a bid basis?

Dr. BUGHER. It will probably be let as a lump sum bid proposition.

Mr. ALLARDICE. Will that reactor serve as a prototype for other medical reactors across the country?

Dr. BUGHER. We hope so. That will depend very much on what the experience is with it over the first year or two of its operation. It does represent from the standpoint of medical application an exploration along a channel quite different from that heretofore utilized.

Mr. ALLARDICE. Do you visualize or would you care to visualize the extent of interest in medical circles in such reactors? In other words, how many might we foresee in the country in the next 15 years?

Dr. BUGHER. It is very difficult to tell at this time. The study which has been made prior to proceeding with the plan for this reactor led us to the conclusion that for neutron fluxes to be used for medical purposes, we have nothing more economical or more satisfactory in performance at the present time than a reactor. So if we may assume that there is nothing in the way of an accelerator in sight which would be more efficient than a reactor, I rather anticipate that over a span of 10 years or so that most of the medical centers in the country would be interested in a reactor for medical purposes.

Representative DURHAM. At the present time you have had no application from any medical organizations in the country for such a reactor?

Dr. BUGHER. One only; from the University of California that was mentioned.

Representative DURHAM. There is no lack of financing or anything like that for it?

Dr. BUGHER. It is not a problem of finance so much at the present time, I believe, as a problem of understanding the possible applications and fitting such a reactor into the research capability of that particular institution.

Representative DURHAM. The reason I asked the question, Doctor, is because I think this is so important. One of the things I think this country has a desire to support fully in every way possible is this. I hope the Commission, if it has a lack of funds or lack of anything, please feels free to let this committee know. I think everybody is fully aware of it.

Dr. BUGHER. Thank you.

Chairman ANDERSON. Are there any further questions? If not, General Nichols will proceed with topic XIII.

Mr. NICHOLS. Part XIII, Status of Organizational Changes Required by New Act: The Atomic Energy Act of 1954 required the Commission to make only one organizational change, that is, the creation of an Inspection Division. However, the act permits the Commission to move forward more rapidly in the peacetime application of atomic energy and the organization will be adapted to facilitate this activity.

An Inspection Division was established in September 1954 with an initial assignment of functions, and after a staff study as to the additional functions that should be assigned to the Inspection Division, a further definition of its role has been made. The Inspection Division will:

(*a*) Directly investigate all questions of employees conduct, fraud, etc., in AEC and contractor organizations.

(*b*) Ascertain that adequate management appraisals are developed and carried out by the specialty divisions.

(*c*) Ascertain that these management appraisals and the internal audit are adequate in the areas they cover and do not involve any unnecessary duplication of activity.

(*d*) Directly inspect licensees for compliance with all license requirements.

(*e*) When directed by the General Manager, inquiring into and reporting upon any other matters that are under the General Manager's authority.

By management appraisals as used in the statement of functions of the Inspection Division is meant the inspection type of activity that is carried on by such specialty divisions as Security, Organization and Personnel, and Construction and Supply, in order to determine whether the specialized activity is (*a*) adequately meeting the service requirements of the project program; (*b*) carried out efficiently and economically; and (*c*) conducted in accordance with applicable regulations.

It would be our expectation that as we have experience with the operation of this new division, further consideration will necessarily have to be given as to the most effective way for it to function.

At least 2 and possibly 3 of our present program divisions are in a large measure concerned with the civilian application of atomic energy. These are Reactor Development, Biology and Medicine, and Research—although, of course, a number of our other divisions render essential supporting service in this area. As the licensing activity increases, it is possible that we will find it desirable to centralize responsibility in a separate division for this activity. Some of the problems which we have discussed with you in the last 2 or 3 days of these hearings make it evident that our organization must be kept under continuous review in order to assure that it is effective in furthering the civilian application of atomic energy.

Chairman ANDERSON. Thank you, General Nichols. Mr. Allardice, you may proceed to question.

Mr. ALLARDICE. In the last part of your statement you say that as the licensing activity increases it is possible that we will find it desirable to centralize responsibility in a separate division for this activity. I would like to ask: Would not such a centralized point now be quite convenient and desirable for applicants who may want to get a license?

Mr. NICHOLS. What we have done in this regard is take the Deputy General Counsel and assigned him the job of doing two things. One in writing the regulations and the procedures for licensees, handling the present ones coming in, and also coming up with a recommendation as to how you handle it in the future.

The reason we left him in the General Counsel's office is that he is assisted by various members of the General Counsel's office plus the remainder of the staff. I think we could almost make it stronger than we stated here. Certainly I think there is definitely going to be a need for a licensing division. He has not yet made his recommendation and therefore it was not put in stronger.

On October 1, I believe, was the date we set up the Deputy General Counsel for this assignment. In other words, we withdrew him from

his normal duties so that he could utilize all members of the staff on this problem.

We have as a temporary expedient centralized the job. We are making it even more centralized for this period here where we have a series of hearings and getting the final regulations coordinated. He now has a draft for almost everything.

I would assume that if we waited for full concurrence of the staff it would take too long. I am giving him a directive that he can get a high level member of each division that will spend the necessary time to expedite getting out these licensing regulations and expedite the hearings. We would hope to get the Commission approval after we complete that on licensees and then they would be issued for the 30-day period of public notice so that we can get the comments of the public at large.

Mr. ALLARDICE. That is all I have.

Mr. NORRIS. May I ask two questions?

Chairman ANDERSON. Yes.

Mr. NORRIS. I have two questions. One rather serious and one a little lighter. The first one is that I have been noticing a large number of times during all of these hearings when you have answered questions, we will decide that on a case-to-case basis when the case arises.

I am wondering if you are aware that when the Hoover Commission examined the Federal Communications Commission's objections they said that the main reason why the Federal Communications Commission was so swamped and behind in the work is because it had taken upon itself the task of deciding things on a case-to-case basis and not freeing itself in order to decide principles and then having delegated to others the application of deciding the case-to-case basis.

Mr. NICHOLS. I don't think it is the intention to carry on the case-to-case basis in the future. We had to do it at the time we were writing the regulations. I certainly agree with that, that you would be swamped if you tried to handle everything on a case-to-case basis.

Mr. NORRIS. The second question is that I believe the Commission sent its proposals, which incorporated a licensing system, up in February. The statute was worked on with emphasis on licensing through June, July; signed by the President in August. It is now February.

I wonder if you knew that the Constitution had been written in 3 months?

Mr. MURRAY. Mr. Chairman, may I just report on one thing? I was asked, as you will recall, by your committee on last Tuesday, in response to a request of Mr. Cole, to prepare some statistics in relation to the time that was spent since last year when the contract was signed down to date.

I would like to report that I think I will be ready by Tuesday to make such a report to you.

Chairman ANDERSON. We will try to schedule some time at the opening of the Tuesday afternoon hearing if that will be all right.

(The information referred to will appear in the appendix to pt. 3.)

The hearing is adjourned until Monday at 2 o'clock.

(Whereupon, at 4:50 p. m., Friday, February 4, 1955, the hearing was adjourned until 2 p. m., Monday, February 7, 1955.)

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